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SOIL SURVEY OF QUEENS COUNTY NOVA SCOTIA

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SOIL SURVEY OF QUEENS COUNTY NOVA SCOTIA

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PREFACE

Because of the public demand for information on the soils of Queens County, N.S., this soil survey report has been reprinted. During the years since the report was published, substantial changes have taken place in survey techniques, in the system of soil classification, and in soil evaluations. The latest edition of *The Canadian System of Soil Classification* is available from authorized bookstore agents, other local bookstores, or by mail for $9.00 ($10.80 outside Canada) from the Publishing Centre, Supply and Services Canada, Hull, Que. K1A 0S9. Your cheque or money order in Canadian funds should be made payable to the Receiver General for Canada.

The map was recompiled on a new topographic base, which has created slight discrepancies along streams and other water features. It is necessary to regard with caution the delineation of adjacent soils, such as stream floodplains.

A generalized soil map of the province was published in 1974 under the title: *Soils of Nova Scotia*. A map depicting the suitability of Nova Scotia soils for septic tanks is also available. Address your requests to: Soils and Crops Branch, Nova Scotia Department of Agriculture and Marketing, Nova Scotia Agricultural College, Truro, N.S.

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The base maps were supplied by the Department of Mines and Technical Surveys, Ottawa and the soil maps were prepared for lithography by the Cartographic Section, Canada Department of Agriculture, Ottawa.

We are indebted to Dr. P. C. Stobbe, Principal Pedologist, Canada Department of Agriculture, who inspected the field work, read the manuscript and made many helpful suggestions.

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INTRODUCTION

This report deals with the soils of Queens County. The first part deals with a general description of the area and discusses the soil forming factors and their effect on soil development. The latter part of the report describes the characteristics of the individual soils, their use and management and their place in the agriculture of the County. In Queens County the principal agricultural areas are restricted to the drumlins, because of the shallowness of the drift and other factors.

A soil map accompanies the report showing the location and the area occupied by the various soil types. Due to the scale of mapping, the soil variations on a single farm may not appear on the map, but the principal soil types are shown and their variations are described in the text.

If you are interested in a particular piece of land, first locate the area on the soil map. The soil types have identifying colors and symbols that appear in the legend in the margin of the map. To obtain information on the individual soils, turn to the text of the report. This way you may find essential information on any soil without reading the whole report. Further useful information about the various soils appears in the section dealing with the use and management of agricultural land in the County (pages 39 to 48).

Readers who are interested in the broader aspects of soil conservation, wildlife conservation, highway planning or land settlement, will find helpful facts throughout the report.

GENERAL DESCRIPTION OF THE AREA

Location and Extent

Queens County lies on the southern coast of Nova Scotia between 43°45′ and 44°30′ north latitude and between 64°30′ and 65°30′ west longitude. It is bounded on the north by Annapolis and Digby counties; on the east by Lunenburg County; on the south by the Atlantic Ocean and on the west by Shelburne County. The greatest distance from east to west is approximately 32 miles; from north to south, 40 miles. The county has an area of approximately 682,630 acres or 1,066 square miles.

The principal town is Liverpool which is situated on a fine harbor at the head of Liverpool Bay. Other important centers are Milton, Brooklyn, Caledonia, East Brookfield, Mill Village, Port Medway and Port Mouton. Liverpool is about 100 miles west of Halifax and 130 miles east of Yarmouth.

Settlement and Population

The settlement of Queens County occurred somewhat later than that of adjacent Lunenburg County. In the period from 1760 to 1765 settlers came to the coast and Liverpool had its beginning about this time. During the Revolutionary War in the United States in 1775, privateers operated out of Queens County ports and piracy flourished along the coast. Following the war there was an influx of settlers, many of whom were highly educated and wealthy, but poorly prepared to withstand the rigors of settlement in a new, and often infertile, land.

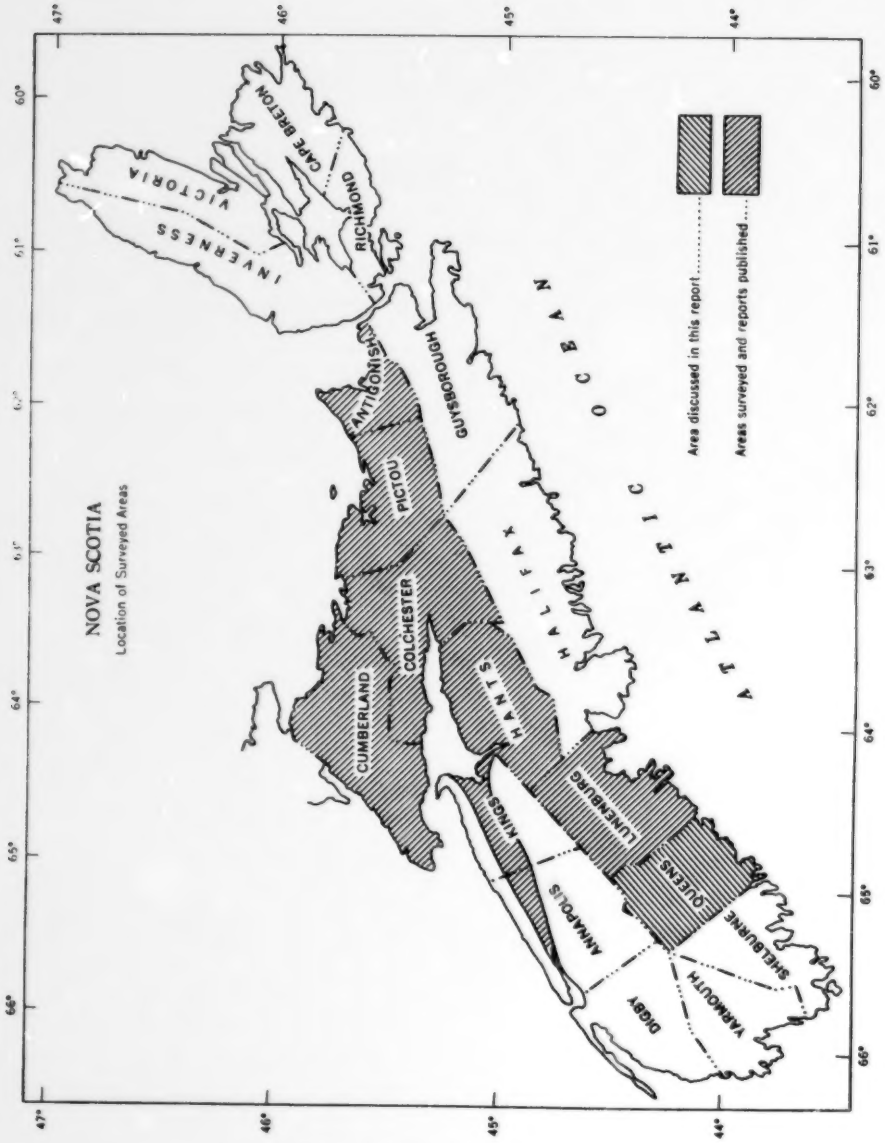

Figure 1. Location of Surveyed Area.

The population of Queens County as given by the 1951 census is 12,544 persons. Of these, about 43 per cent live in the urban centers and the remainder are rural dwellers. Of the rural population, only about 17 per cent are engaged in farming; the remainder are occupied in lumbering or fishing. The trend of population over the past 70 years is illustrated in Figure 2. There has been little change in population over this period, although it is now beginning to rise slightly.

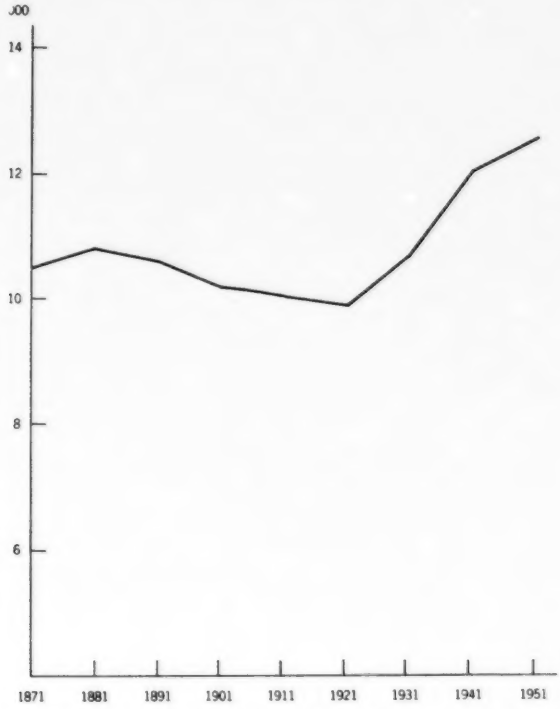

Figure 2. Population trend in Queens County.

The majority of the population trace their origin to British Isles races, but there is a considerable proportion of German and Netherlandic stock. The racial origin of the people is given in Table I.

TABLE I. RACIAL ORIGIN OF POPULATION IN QUEENS COUNTY, 1951

British Isles	7,822
Germany	1,598
Netherlands	1,852
France	697
All others	575
Total	12,544

Transportation and Markets

The urban and rural areas of Queens County are linked with a good system of highways which facilitates getting products to market. A paved highway along the coast connects Liverpool with Halifax and Yarmouth and a road from

Liverpool to Annapolis, on the north shore of the Province, is paved beyond Caledonia. Figure 3 shows the principal roads in the area. Caledonia is connected by rail to a line running from Bridgewater to Middleton and other parts of the Province. There are numerous harbors along the coast, but Liverpool is the principal port for deep water ships. The other harbors afford excellent shelter for smaller boats of the fishing fleet and provide recreational areas.

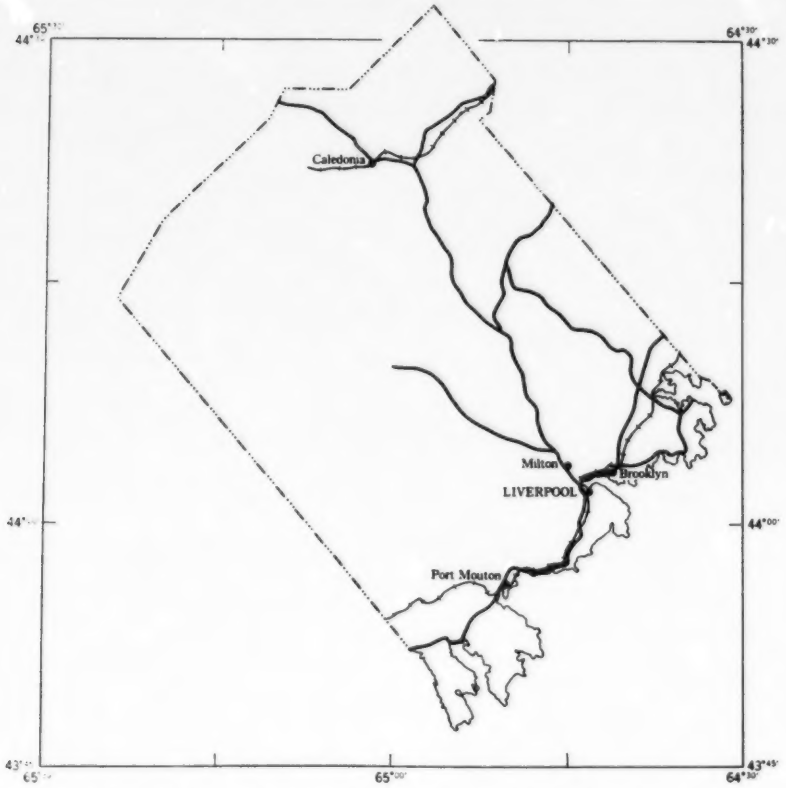

Figure 3. Outline map of Queens County showing location of principal towns, roads and railroads.

Most of the farm produce grown in the areas is consumed locally, and there is usually not sufficient to meet the demand. Liverpool and Brooklyn furnish the largest markets for farm produce.

Industries

Apart from farming, the principal industries in Queens County are lumbering and fishing. At Brooklyn there is a large pulp and paper mill that uses a large part of the forest products from the area and employs many people. Here also is a plant for the manufacture of yeast. Liverpool has machine shops and foundries engaged in fitting ships. The manufacture of margarine and fish oil are rapidly expanding industries creating employment and increasing the demand for agricultural products. These industries have attracted a large

number of people from the farm, particularly from those areas where the soil is not very suitable for crop production. In a few cases, good land has been abandoned for the higher pay and shorter working hours to be found in the towns.

Community Facilities

Most of the rural areas are supplied with electricity and telephone communication. Good schools are found in the larger centers and in the municipal districts. Liverpool has many fine homes and public buildings and possesses a rich historical background.

The lakes and forests of the County provide excellent hunting and fishing and these attract many sportsmen during the year. Fine beaches occur along the coast such as at White Point, Hunts Point, Summerville and Port Mouton; used for recreation during the summer, they attract large numbers of visitors.

FACTORS AFFECTING SOIL FORMATION IN QUEENS COUNTY

In an area such as Queens County, soil formation is largely the result of the action of climate on parent materials. The kinds of soil that develop are also influenced by other factors such as drainage, vegetation, topography, erosion and time. Climate is the major factor in soil formation and, given sufficient time, the other factors tend to reach an equilibrium with the climate. The resulting soils are an expression of the interaction of the various factors and may be grouped according to the characteristics that they display in a vertical section or profile.

The various soil forming factors, as they exist in the surveyed area, are briefly discussed below.

TABLE II. MEAN MONTHLY TEMPERATURE AND PRECIPITATION AT SELECTED STATIONS

	Liverpool		Springfield	
	Years Observed 26 Elevation 40′ (Approx.)		Years Observed 19 Elevation 550′ (Approx.)	
	Mean Temperature	Precipitation	Mean Temperature	Precipitation
December	29	5.82 (10.6)*	28	5.32 (17.5)*
January	24	5.68 (16.5)	25	5.48 (22.6)
February	23	5.61 (21.9)	22	4.00 (19.6)
Winter	25	17.11	25	14.80
March	30	4.60 (11.6)	30	4.33 (13.2)
April	39	5.04 (4.7)	40	4.48 (7.4)
May	49	4.11 (0.2)	51	2.78 (0.4)
Spring	39	13.75	40	11.59
June	57	4.67	61	3.19
July	64	4.33	65	3.70
August	63	4.51	64	3.86
Summer	61	13.51	63	10.75
September	57	4.10	57	3.58
October	49	5.76 (0.1)	49	4.47 (0.3)
November	39	5.31 (1.7)	39	4.31 (4.2)
Fall	45	15.17	48	12.36
Year	44	59.54 (67.3)	44	49.50 (85.2)

* Inches of snowfall. 10 inches of snow = 1 inch of rain.

Climate

The climate of Queens County is humid temperate. The climatic data for the area are obtained from two stations—one at Liverpool in the southern part of the County and the other at Springfield, just outside the northern boundary of the County.

The average annual temperature is 44°F. and is quite uniform throughout the area. Mean summer temperatures range from 50° to 75°F. with an average of 62°F. Inland, summer temperatures are higher and winter temperatures lower than along the coast, where the Atlantic Ocean modifies the climate.

Precipitation is variable throughout the County. More falls near the coast than inland and the Liverpool station reports about 60 inches of precipitation annually. A larger proportion of the inland precipitation falls as snow than along the coast. The temperature and precipitation recorded at these two stations over a period of years are given in Table II. The data are compiled from reports of the Meteorological Division, Canada Department of Transport.

The rainfall is fairly well distributed throughout the year and about one-third of the precipitation falls during the growing season. The growing period averages 170 to 190 days and the frost-free season ranges from 110 to 116 days on the average.

The effect of climate depends largely upon the effective precipitation or the amount of water that actually runs through, or remains in, the soil. This will, in turn, be governed by the other soil forming factors. In Figure 4 the Thornthwaite[1] values for the soil moisture relationships are shown graphically as calculated from the temperature and moisture data for the two stations. Briefly, these charts show that there is no serious depletion of soil moisture during the summer months.

Parent Materials

The parent materials of the soils of Queens County were deposited almost entirely as glacial drift, but there are a few areas of more recent origin. The materials are derived from the underlying rock formation which consist of granite, quartzite, slate and schist. Over a large part of the County, the drift is thin and tends to be very stony. Where slate is the underlying rock, the drift is deeper and some drumlins have been formed. The distribution of the drift is shown in Figure 5 and the bedrock formations underlying the County are shown in Figure 6.

Most of the drift consists of glacial till which ranges in texture from a silt loam to a coarse sandy loam. The texture and composition of the till depend upon the proportions of the underlying rocks that have been mixed together during glaciation. Where the composition of the till is dominated by granite, the parent material is a pale yellow, coarse sandy loam that is usually thin over bed rock. Water percolates through this material rapidly and soils tend to be droughty. Stoniness and shallowness are a feature of this type of parent material.

Parent materials derived principally from quartzite are olive colored and sandy loam in texture and also tend to be shallow and stony. These materials have a somewhat better water holding capacity than those derived from granite. Where slate forms the major component of the till, the material is an olive gray sandy loam to loam. It is deeper and less stony than the materials mentioned above and most of the farming areas of the County are found on soils developed from slaty material, particularly where the material has been deposited in the form of drumlins. In the southwestern part of the County, the

[1] Thornthwaite, C. W. An approach toward a rational classification of climate. Geogr. Rev. 38:55-94, 1948.

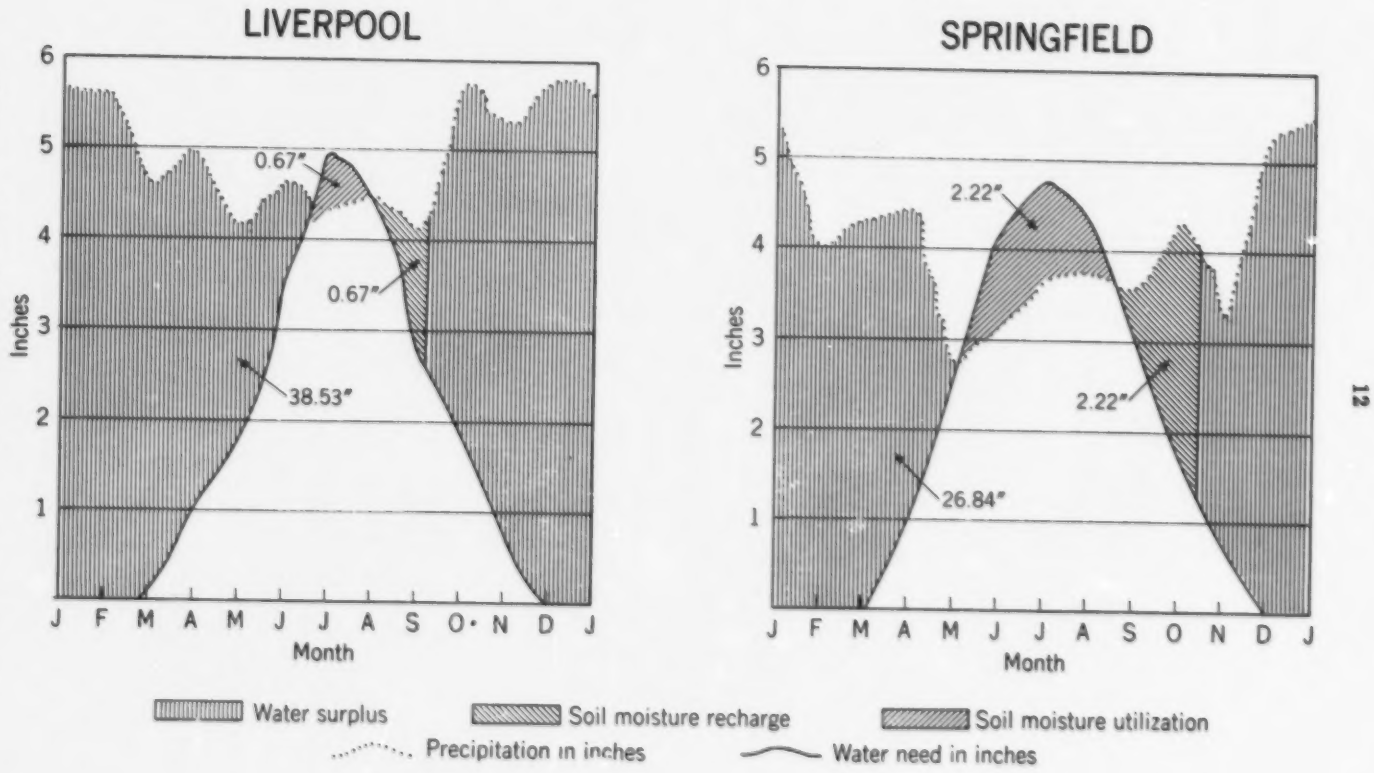

Figure 4. Potential evapotranspiration at selected stations.

parent materials contain a major proportion of schist, giving rise to an olive colored loam to silt loam. Most of this material is stony or shallow and rock outcrop occurs frequently in such areas.

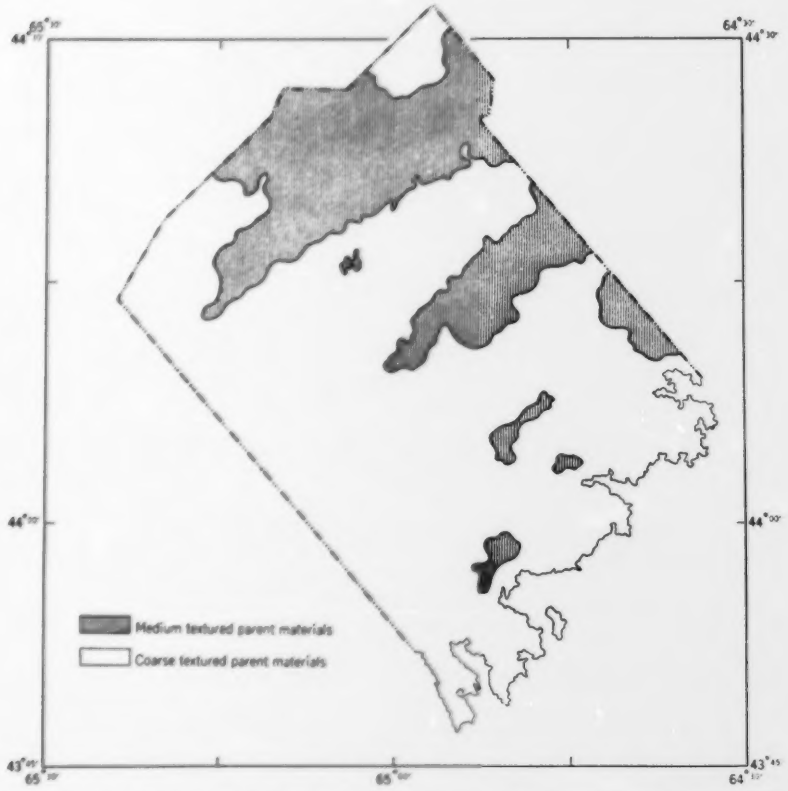

Figure 5. Distribution of soil parent materials in Queens County.

There are many deposits of sand and gravel scattered throughout the County in the form of outwash plains, kames, eskers and terraces. These materials were deposited by streams flowing from or within the ice sheet and they vary in their degree of sorting. They are composed of a mixture of the underlying rock types with slate predominating in some places and the harder rocks in others. Soils developed from these materials are droughty and usually unsuitable for agriculture.

Along the present stream channels throughout the County there are deposits of medium textured materials of recent origin. They are stone free and have not been in place long enough to develop distinct soil horizons. The texture of these materials ranges from fine sandy loam to loam and some areas are suitable for agriculture. Numerous depressional areas throughout the County contain deep deposits of organic matter as peat. These areas were the former sites of shallow lakes in which plant remains have accumulated.

Vegetation

A large part of Queens County is covered with forest and some excellent stands of timber may be found. The principal trees include beech, sugar maple, red maple, red oak, yellow birch, wire birch, red and white pine, red and black spruce, poplar, balsam fir, hemlock, tamarack and juniper.

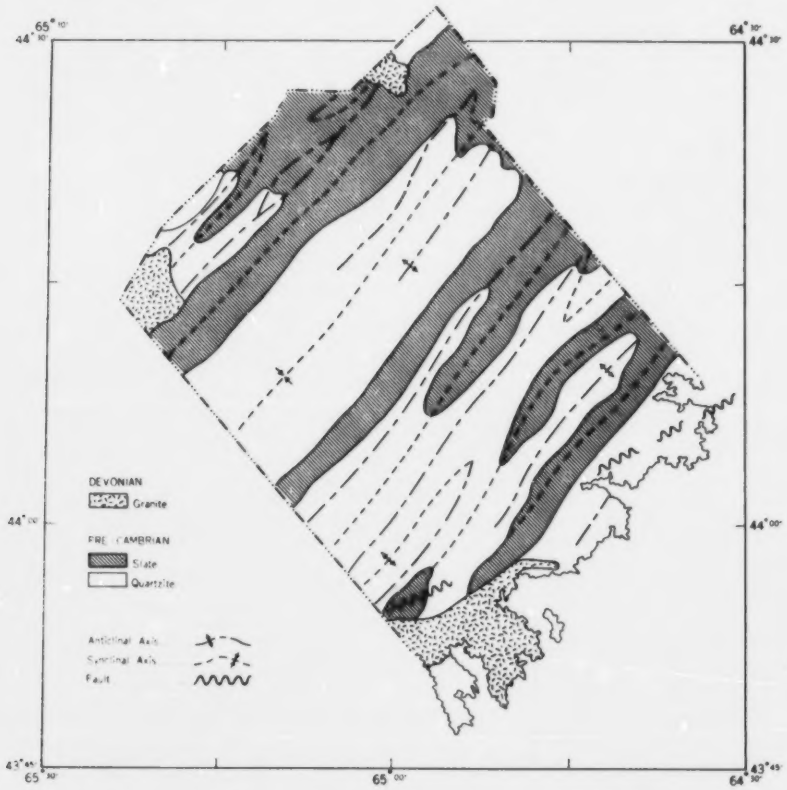

Figure 6. Geological formations of Queens County.

The distribution of the various kinds of trees varies with the amount of moisture and drainage. Along the coast, red spruce and balsam fir are the dominant trees found on the fairly well drained sites. Where drainage is imperfect to poor, black spruce and tamarack dominate and are sometimes accompanied by poplar, red maple and alder. On the dry, sandy sites, red and white pine are the dominant trees, accompanied by wire birch and occasionally oak.

Inland, the higher ridges support a growth of maple, beech, birch, red spruce and hemlock. Some good stands of pure hemlock are found in northern parts of the County. Where granite underlies the soil the principal forest cover is red and white pine, red oak, wire birch and poplar. Many of these areas have been burned over and are now barrens covered with blueberry, bracken, stunted fir and pine. Boggy depressions support a growth of sphagnum moss, sedges, cotton grass and cat-tails.

The cultivated areas support a growth of grasses and legumes. The principal grass grown for hay is timothy (*Phleum pratense*) or mixtures of timothy and red clover (*Trifolium pratense*), white clover (*Trifolium repens*) and brown top (*Agrostis tenuis*). Pasture grasses consist of brown top, red fescue (*Festuca rubra*), Kentucky blue grass (*Poa pratensis*), couch grass (*Agropyron repens*) and poverty grass (*Danthonia spicata*). When pastures become run out the following weeds generally appear—blue-eyed grass, green brier, bladderwort, golden-rod, gentian, spirea, wild raspberry and blackberry. In the wetter pastures the spike rush, bullrush, bog fern, sedges and club moss form a large part of the vegetation. Salt marshes along the coast are covered with sea blite, saltwort, rockweed, juncus and broadleaf species.

Topography and Drainage

The topography of Queens County may be described as a broad, undulating plain sloping upward toward the north until it reaches an elevation of about 500 feet at the northern boundary. The relief is controlled to a large extent by the bedrock. The slates and quartzites which underlie most of the area are folded in broad, parallel, pitching anticlines having a northeast—southwest trend. The quartzite is exposed in broad, smooth ridges with the slate forming the intervening depressions. Subsequent glaciation transverse to the strike of

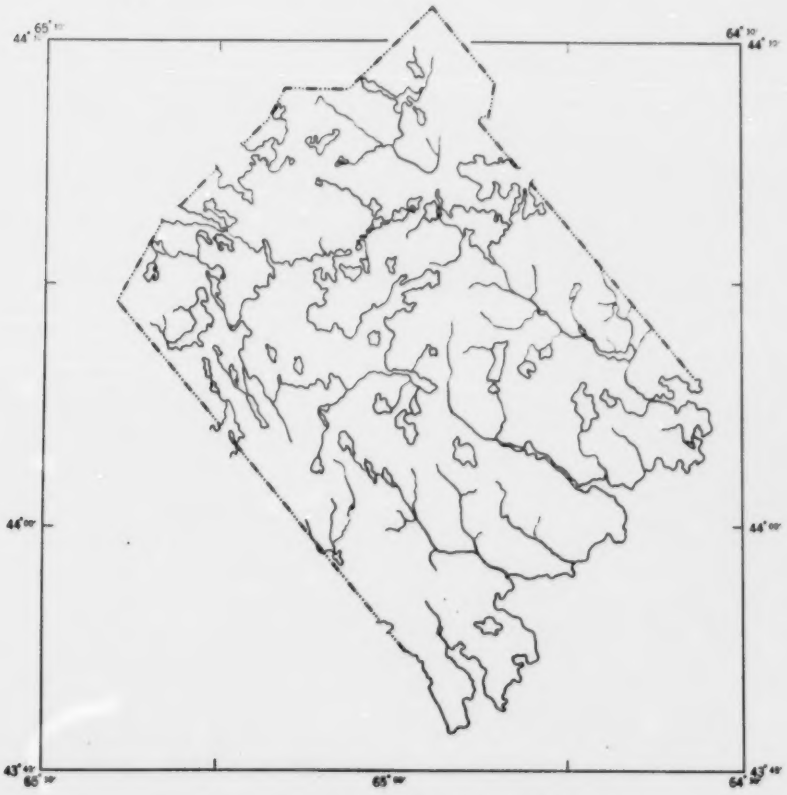

Figure 7. Drainage pattern of Queen's County.

the strata filled some of the former valleys and produced an undulating to hummocky type of topography. The hard quartzite and granite furnished little material to the ice sheet and the drift over these areas is very thin and stony. In the slate areas, enough material was accumulated to form drumlins which rise 50 to 100 feet above the general level of the surrounding country.

Nearly 14 per cent of Queens County is covered by lakes among which is Lake Rossignol, the largest lake on the mainland of the province. Most of these lakes are connected by shallow streams which, in the granite and quartzite areas, flow aimlessly from one lake to another, sometimes becoming lost in peat bogs, which are scattered in profusion throughout the area. The County is drained by three principal rivers—the Medway, Mersey and Broad—which flow into the Atlantic Ocean. These rivers provide excellent fishing. The numerous lakes provide a source of recreation and help to temper the climate. The drainage pattern is shown in Figure 7.

The effect of topography and drainage on soil formation results largely from the amount of water that percolates through the soil. On steep slopes much of the precipitation will run off. On moderately sloping topography, the amount of water that enters the soil will be determined by the slope and the physical nature of the parent material. Often, small changes in slope will greatly affect the amount of erosion that takes place and soil development may be retarded.

Erosion

Natural erosion usually proceeds at such a slow rate that soil development is in equilibrium with it. When land is cleared of trees, organic matter is rapidly depleted and accelerated erosion takes place. The amount of erosion will then depend upon the type of soil material, the slope and the method of cultivation, but the result is usually loss of surface soil that takes many years to replace. Accelerated erosion causes the silting of streams and ponds, increases seasonal flooding on lower areas, and, as well, depletes the wildlife population.

In Queens County large areas are in forest and also a large part of the cultivated areas is in hay or pasture so that erosion is not very serious. The cultivated slopes are confined almost entirely to the drumlins and here there may be serious sheet erosion with hoed crops, when grown on the steeper slopes. Some form of cultivation and planting of crops along the contour of the land would be a useful practice here.

Time

The length of time required to develop a soil varies widely with the climate, parent materials and other factors of soil formation. It is estimated that the parent materials in Queens County have been exposed to the other factors of soil formation for at least 15,000 years. Most of the soils developed on well drained glacial drift have reached a mature stage, while others are in various stages of development.

THE CLASSIFICATION AND DESCRIPTION OF THE SOILS

The combination of the various soil forming factors described above tends to produce leached, acid soils known as Podzols. Such soils are common where high rainfall, long cold winters and short, cool summers prevail. Podzolization involves the accumulation of organic matter on the surface, its subsequent decomposition and the removal of soluble bases, clay, iron and aluminum compounds from the upper part of the profile under the influence of acid percolating water. These compounds are deposited in the lower part of the profile and result in the formation of horizons or layers that usually are different in color and texture from the horizons above and from the parent material.

In coarse textured parent materials, this process will take place more rapidly than in finer textured materials. Consequently, the differences in the soils of Queens County are associated with differences in the texture of the parent materials and differences in the natural drainage.

Podzol characteristics are most pronounced on the well drained, coarse textured parent materials in the County, particularly along the coast where precipitation is high. The typical profile has a layer of organic matter on the surface varying from 2 to 5 inches thick, underlain by a thick, gray ashy layer from which soluble materials have been removed. Beneath this is a dark colored horizon in which the soluble products from above have been deposited. This horizon varies in color from a dark reddish brown to a dark yellowish brown and may be cemented in the upper part. It is usually slightly finer in texture and darker in color than the parent material on which it rests.

The Port Hebert soil, which is developed from coarse textured parent materials of mixed origin, represents the maximum Podzol development found in Queens County. A profile of this soil developed under a vegetation of pine, birch, poplar and spruce is described below.

A_0 6 to 0 inches—black semi-decomposed organic matter; felty or fibrous mor; pH 3.9.

A_2 0 to 4 inches—gray (10YR5/1) sandy loam; friable; pH 4.2.

B_{21} 4 to 6 inches—dark brown (7.5YR3/2) sandy loam; firm; iron cemented; pH 4.4.

B_{22} 6 to 20 inches—yellowish brown (10YR5/6) sandy loam; firm; weakly cemented; subangular blocky structure; stony; pH 4.5.

C 20 + inches—pale yellow (5Y7/4) sandy loam; firm; stony to bouldery; pH 4.5.

The well drained soils developed from medium textured materials, especially from slate and schist, are not so heavily leached and the differentiation of horizons is not so marked. The soils that have developed under imperfect natural drainage have a thicker layer of organic matter on the surface. The lower part of the profile and the parent material are usually mottled with gray or yellowish brown splotches due to decreased aeration. The amount of mottling varies with the degree of drainage.

Where soils have developed under poor natural drainage they have accumulated considerable organic matter on the surface. This is underlain by a thick, dark gray to olive colored, mottled sub-surface horizon. This horizon is developed where organic matter exists under conditions of poor aeration and drainage. The process is called gleying and the layer is called a gley horizon.

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It differs from the leached, gray layer found in well drained profiles in that the process is one of reduction rather than leaching and removal. The subsoils in these soils are strongly mottled.

Throughout the County there are many depressional, poorly drained areas where organic matter has accumulated in the sites of former lakes to form peat bogs.

Soil Survey Methods

A preliminary reconnaissance was made to determine the nature and characteristics of the soils of the County. From this information a suitable mapping legend was prepared and the soils were mapped.

All roads and accessible trails in the area were traversed and the characteristics of the various soils studied, both in exposures along the highways and in cultivated fields as well as in pits dug in forested areas. Notes were taken regarding the vegetation, soils, crops and suitability for use, for incorporation into this report. In cleared areas it was possible to check the soil boundaries throughout their course. In wooded areas, however, the plotting of boundaries depended on observations made at widely separated intervals and on knowledge gained from aerial photographs of the County. The information was plotted on base maps on a scale of two inches to one mile.

When mapping was completed, the principal soil types were sampled by taking a sample from each horizon down to, and including the parent material. The analytical results are presented at the end of this report.

System of Classification

Over a broad area or zone where the climate is quite uniform, soils that are developed from parent materials similar in color, texture, structure, consistency and lithology, form a catena. Soil catenas may be separated from one another on the basis of differences in one or more of these characteristics.

Within a catena, differences in drainage produce differences in the characteristics of the soil profile. On this basis it is possible, in Queens County, to separate three members in a catena—the well drained, imperfectly drained and poorly drained member. Some catenas may have only one, and some more than three members. Each of these members is known as a soil series. That is, a soil series is a group of soils developed from a particular type of parent material and having similar differentiating horizon characteristics. Variations in surface texture or other properties such as slope, erosion or stoniness within the soil series may be of sufficient importance to justify the separation of soil types. The soil type was the unit used to map the soils of Queens County. The soil type name consists of the series name plus the designation of the variations of properties within the series, e.g. Bridgewater stony sandy loam.

The soil series mapped in Queens County have been arranged in a key in Table III. The soils are arranged according to differences in texture of the parent material, drainage and the kinds of profiles which they develop. The soils in each vertical column develop similar profile characteristics, but differ in properties associated with the different parent materials. Horizontally, the soils are members of the same catena.

This key also groups some important properties of the soils. The finer textured, well drained soils have a better moisture holding capacity than the coarser textured soils. The coarser materials are more readily leached and hence are less fertile and more droughty than fine textured soils.

The horizontal arrangement of the soils from well drained to poorly drained, is accompanied by an increase in organic matter reading toward the right. The poorly drained mineral soils are also better supplied with nitrogen than

TABLE III. A KEY TO THE SOILS OF QUEENS COUNTY

Parent Materials		Regosolic Soils		Podzolic Soils		Gleisolic Soils		Organic Soils
		Alluvial Soils		Podzols		Eluviated Gleys		
Texture	Color	Good natural drainage	Imperfect natural drainage	Good natural drainage	Imperfect natural drainage			
Silt loam to loam	olive gray			Mersey	Liverpool		Swamp	
				Bridgewater	Riverport	Middlewood	Swamp	
Sandy loam	pale olive			Halifax	Danesville	Aspotogan	Swamp	
	pale yellow			Farmville				
				Gibraltar	Bayswater	Aspotogan	Swamp	
				Port Hebert	Lydgate	Roseway	Swamp	
Gravelly sandy loam over stratified sand and gravel.	grayish brown			Lahave				
				Medway				
Fine sandy loam 15″—30″ over sand and gravel.	brown		Cherryfield					
Organic deposits	Basal layer of sedimentary peat						Swamp	Rossignol
	Basal layer of spalter peat						Swamp	Peat

the well drained soils developed from similar materials. Drainage is required before the poorly drained soils can be used for cultivated crops and it may be easier to drain the soils developed from the coarser textured materials than the finer textured soils.

The acreage of the various soil types in Queens County is given in Table IV.

TABLE IV. ACREAGE AND DISTRIBUTION OF SOILS IN QUEENS COUNTY

Soil Type	Acres	Percentage
Mersey loam	9,401 6	1 38
Liverpool sandy loam	1,286 4	19
Bridgewater sandy loam	114,444 8	16 77
Bridgewater loam—drumlin phase	25,888 0	3 79
Riverport sandy loam	5,337 6	.78
Middlewood sandy loam	307 2	.05
Halifax sandy loam	214,316 8	31 40
Halifax sandy loam—drumlin phase	5,414 4	79
Danesville sandy loam	109,785 6	16 08
Farmville sandy loam	76 8	.01
Gibraltar sandy loam	22,182 4	2 25
Aspotogan sandy loam	1,996 8	.29
Port Hebert sandy loam	9,011 2	1 32
Lydgate sandy loam	2,649 6	.39
Roseway sandy loam	153 6	.02
Lahave gravelly sandy loam	243 2	.04
Medway sandy loam	1,030 4	.15
Cherryfield fine sandy loam	44 8	.01
Rossignol sedge peat	4,128 0	.60
Peat	30,956 8	4 53
Swamp	11,942 4	1 75
Salt Marsh	70 4	.01
Coastal Beach	787 2	.12
Rock Land	16,256 0	2 38
Lakes	94,918 4	13 90
Total	682,630 4	100 00

Description of Soils

A. Soils Developed from Medium Textured Parent Materials

The soils in this group comprise two catenas that are developed from somewhat similar parent materials, but differ in lithological origin. The well drained Mersey and the imperfectly drained Liverpool series are developed from an olive gray loam to silt loam derived from schist; the well drained Bridgewater, imperfectly drained Riverport and the poorly drained Middlewood soils are developed from loam to sandy loam parent materials derived largely from slate. Varying proportions of quartzite and granite are mixed with the parent materials of these soils resulting in local variations of texture and stoniness. The characteristics of the soils are described below. These soils occupy about 23 per cent of the area and nearly all of this is well drained.

Good natural drainage

Mersey Loam (9,401 acres)

Description—In Queens County, the Mersey soils occur in a narrow band about two miles wide that runs from the vicinity of Danesville through Mill Village, Milton and westward across the Broad River just north of Port Mouton.

The Mersey soils are associated with, and resemble, the Halifax soils, but they are less stony and usually have deeper profiles. The soils lie on an undulating topography, but there are a few areas with dissected or broken relief. Both surface and internal drainage are good. Surface stoniness is variable and rock outcrop is quite frequently encountered, but where the drift is deep, the surface stoniness is at a minimum.

Most areas of the Mersey soils are forested and the general tree cover consists of maple, birch, beech, oak, pine, spruce, and poplar. The Mersey loam described below is typical of the Mersey soils.

A_0 3 to 0 inches—black semi-decomposed organic matter; loose and fibrous; mor; pH 4.0.

A_2 0 to 2 inches—light gray (10YR7/2) loam; structureless; very friable; pH 4.2.

B_{21} 2 to 9 inches—dark yellowish brown (10YR4/4) loam; fine crumb structure; friable; schist fragments; pH 4.5.

B_{22} 9 to 24 inches—yellowish brown (10YR5/8) loam; medium crumb structure; moderately firm; pH 4.6.

C 24 + inches—olive gray (5Y5/2) loam to silt loam; firm; schist fragments and cobbles; pH 4.8.

The most noticeable characteristic of these soils is a deep, loamy B horizon—usually much deeper than in any of the other soils of the area. Textures range from medium sandy loam to silt loam and, generally, the whole profile has a soft feeling when rubbed in the hand. The nature of the underlying rock limits the deeper phases of the Mersey soil to pockets between the smooth, shallow ridges.

Utilization—Practically none of the Mersey soils have been cultivated in Queens County and at present they are largely covered with forest. There are a few areas, such as north of the railroad at Port Mouton and along the Broad River, that have fairly good agricultural possibilities, but economic factors will discourage their development for some time. The soils are quite acid and, when cleared, would require liming and fertilizer to produce successful crops. In some of the western counties of the Province, areas of the Mersey soils have been cleared and farmed quite successfully, but judgement should be used in choosing new areas for agricultural development. The soils support an excellent forest growth and the shallower areas should be used for this purpose.

Bridgewater Loam—Drumlin Phase (25,888 acres)

Description—The Bridgewater soils occur chiefly in the vicinity of Caledonia and East Brookfield, where the soft slaty material was deposited in the form of drumlins. Surface drainage is moderately rapid and the internal drainage ranges from moderately rapid to moderately slow, depending upon the variations in texture of the soil. Most of the drumlin areas are cleared and stoniness is not much of a problem, but there are a few places where there are granite boulders scattered on the surface. The virgin areas support a growth of gray birch, sugar maple, red oak and pine on the drier sites and hemlock, fir, spruce and poplar on the more moist sites.

The Bridgewater soil as found on the drumlins is described below.

A_0 2 to 0 inches—black, felty mor; loose and fibrous when dry; pH 4.0.

A_2 0 to 1 inch —light brownish gray (10YR6/2) loam; medium granular structure; very friable; often patchy; pH 4.5.

B_2 1 to 9 inches—yellowish brown (10YR5/6) loam; fine crumb structure; moderately friable; pH 4.8.

B_3 9 to 21 inches—light olive (2.5Y5/4) loam; fine crumb structure; moderately firm; pH 5.0.

C 21 + inches— olive gray (2.5Y4/2) loam; structureless; firm; numerous slate fragments; pH 5.2.

The Bridgewater soils occupy rolling drumlin topography and are the most important agricultural soils in the County.

There are a few places where an A_1 horizon is developed in the Bridgewater soils under forest. It is usually a very thin layer about one inch thick. The A_2 horizon is also weakly developed and the Bridgewater soils seem to have resisted the leaching process to a greater extent than most of the soils ir Queens County. In general, the texture of the Bridgewater soils in Queens County is slightly finer than those in Lunenburg County.

Utilization—The Bridgewater loam is one of the most important agricultural soils in the county and most of the farming is done on this soil type. It is capable of producing good yields of most of the crops suitable for the area when properly managed. On the steeper slopes, the Bridgewater loam is subject to erosion when intertilled crops are grown. If such slopes are used for this purpose, some form of strip cropping or contour farming should be practiced and the fields left in hay or pasture as long as practicable.

Hay, grain and potatoes are the principal crops grown on the Bridgewater soils. Some of the rougher cleared land is used for pasture. Unless organic matter is supplied and fertilizer is used, the hay stands are usually thin. Liming alone seems to increase the hay yields, but it needs to be supplemented with organic matter and fertilizer.

Vegetable growing occupies a large part of the cultivated area on the Bridgewater loam and there is an excellent market in the County for more of this type of product. Potatoes seem to give good yields on this soil and they are usually fertilized with fairly heavy applications of commercial fertilizer, mainly 5-10-13, 3-15-6 and 6-12-12.

A few orchards are found on the Bridgewater loam and the soil seems to be well suited to this type of culture. The chemical analysis of the soil shows that it is deficient in available magnesium and this might have an effect on the production of apples, but could be corrected by the addition of dolomitic limestone. Most of the fertilizer used is applied to the grain and vegetable crops. Manure is used to top dress the hay fields, but many of these are run out and require considerable addition of organic matter and fertilizer to restore them to a good productive state.

Bridgewater Sandy Loam (114,444 acres)

Description—The Bridgewater sandy loam occurs on undulating topography between the drumlins occupied by the Bridgewater loam. Over a considerable area the drift is thin and these soils are shallow with bedrock frequently exposed. The internal drainage of the sandy loam is more rapid than that of the loam and the moisture holding capacity is low. There are a few areas where the till is deeper and somewhat finer in texture and these areas are suitable for agriculture. The profile contains a considerable amount of slate fragments.

The Bridgewater sandy loam has a profile similar to that of the loam, except that the texture of the surface horizons is somewhat coarser. The B horizons are lighter in color on the average, usually grading from a strong brown through a yellowish brown to the olive gray parent material.

Utilization—Most of the Bridgewater sandy loam is too shallow for agricultural use, especially in the area west of West Caledonia and also north of Menchan Lake. There are small areas where the soil is deeper and individual fields of small acreage could be cultivated. In such places the soil can be handled in the same manner as the Bridgewater loam. Lime and organic matter are necessary to lower the acidity and to improve the moisture holding capacity of the soil. A few of the more level shallow areas might be suitable for pasture with proper fertilization and management.

The Bridgewater sandy loam is well suited to forest. Pine and hemlock grow well and forestry is probably the most profitable use of the sandy loam type.

Imperfect natural drainage

Liverpool Sandy Loam (1,286 acres)

Description—The Liverpool series of soils occur on imperfectly drained sites associated with the Mersey soils. The principal areas of these soils are found on the slopes to the east and west of the Mersey river in the vicinity of Milton. The topography ranges from long slopes to gently undulating relief, but there are a few places where the topography may be gently rolling, with outcrops appearing on the knolls. Internal drainage is moderately slow and is controlled by the micro-relief, the attitude and depth of the underlying rock and the firmness of the parent material. Stoniness is variable and occasionally there are slabs of schist and quartzite boulders on the surface but, in general, rock outcrop is more frequently seen than boulders.

The greater part of the Liverpool soils is covered with tree growth consisting chiefly of red maple, black spruce, wire birch and poplar. A typical profile of the Liverpool sandy loam is described on the next page.

A_0 3 to 0 inches—black semi-decomposed, fibrous, felty mor; pH 4.0.

A_2 0 to 2 inches—gray (10YR5/1) sandy loam; structureless; friable; schist fragments; pH 4.2.

B_{21} 2 to 8 inches—dark yellowish brown (10YR4/4) sandy loam; fine granular structure; mottled with distinct, dark brown, medium mottles; pH 4.4.

B_{22} 8 to 18 inches—yellowish brown (10YR5/6) loam; firm; structureless; dark brown, medium to coarse mottles; pH 4.6.

C 18 + inches—pale olive (5Y6/4) loam; structureless; firm; numerous schist fragments; some mottling; pH 4.8.

The texture ranges from a sandy loam to loam and a few areas of silt loam texture have been included with this type. The profiles are usually not so deep as those of the Mersey soils and mottling varies with the degree of drainage. In many cases the Liverpool soils form a land pattern with the well drained Mersey soils and are so intimately mixed with them as to form a complex, and separation of the individual soils is not practical on the scale of mapping used.

A few small areas having quite poor drainage were included with the Liverpool soils. In these places, the soil has 6 to 8 inches of organic matter on the surface underlain by a dark gray, strongly mottled sandy loam. This rests on a grayish brown B_2 horizon that is moderately firm and mottled and grades through an olive gray sandy loam into the dark olive gray parent material at a depth of 16 to 18 inches. The whole profile is strongly mottled and schist and quartzite stones are in abundance.

Utilization—Little use has been made of the Liverpool soils in Queens County. The limiting factor is primarily the amount of rock outcrop and it is not uncommon to see intertilled crops in fields containing up to 15 per cent exposed bedrock. In some cases the lack of any better soils in the locality has forced the use of the Liverpool soil and, where drainage is not too poor, some excellent hay and grain crops have been produced. The soil responds well to additions of organic matter in the form of manure. It also provides good pasture when commercial fertilizer is used. Since the soils are acid, liming gives beneficial results and seems to be necessary for maximum grass yields. The growing of intertilled crops on the Liverpool soils will be conditioned by drainage and the extent to which farm machinery can be used.

Riverport Sandy Loam (5,337 acres)

Description—The Riverport soils occur on imperfectly drained sites associated with the Bridgewater sandy loam. Drainage is usually restricted by the nature of the bedrock which often lies in a horizontal position. The larger areas of the Riverport soils occur east of Pleasant River Lake and north of Caledonia. The stoniness is variable, but there is usually sufficient stone to make clearing difficult or not practical. The soils resemble the Bridgewater sandy loam, but have darker colored and somewhat mottled profiles. Variation in the thickness of the solum within short distances is one of the characteristics of the Riverport soils, and this is accompanied by changes in drainage and color of the soil horizons. The principal tree cover consists of red maple, hemlock, spruce, fir, poplar and wire birch. A profile of the Riverport sandy loam is described below.

A_0 4 to 0 inches—black to dark grayish brown, felty mor; pH 4.3.

A_2 0 to 4 inches—gray (10YR5/1) sandy loam; fine granular structure; very friable; slate fragments; pH 4.4.

B_2 4 to 10 inches—dark yellowish brown (10YR4/4) sandy loam; medium granular structure; moderately firm; dark brown mottles; occasional cobbles; pH 4.8.

B_3 10 to 20 inches—light olive (2.5Y5/4) sandy loam; medium granular structure; firm; mottled with dark brown, distinct mottles; pH 4.9.

C 20 + inches—olive (5Y5/3) loam; structureless; very slaty; very firm; diffuse gray and brown mottles; pH 5.0.

In Queens County there are many areas where the imperfectly drained Riverport soil is intimately mixed with the poorly drained Middlewood soil and drainage varies rapidly within short distances. Occasionally the surface of the Riverport soil is mossy, especially where the drift is only several inches deep over bedrock.

Utilization—The greater proportion of the Riverport soils in Queens County is best suited to forest. A few fields have been cleared on the deeper areas and hay and grain have been grown successfully, but fairly large continuous areas of this type do not exist. Some of the better drained areas may be suitable for pasture.

Poor natural drainage

MIDDLEWOOD SANDY LOAM (307 acres)

Description—Only a small area of the Middlewood soils was mapped in Queens County. They occur on depressional topography associated with the Bridgewater and Riverport soils, where bedrock is close to the surface and restricts free drainage. Some of these soils have very poor drainage. The surface is frequently stony and slabs of slate or quartzite boulders are common. The vegetation consists of black spruce, red maple, tamarack, and alder. Sphagnum moss occurs on the surface in the very poorly drained sites. The following is a description of a Middlewood profile.

A_o 8 to 0 inches—black, poorly decomposed organic matter; felty and fibrous; pH 3.8.

A_{2g} 0 to 6 inches—grayish brown (10YR5/2) sandy loam; structureless; friable; yellowish brown, fine, distinct mottles; pH 4.2.

B_g 6 to 20 inches—olive gray (5Y5/2) loam; structureless; firm; yellowish brown, medium, distinct mottles; numerous slate fragments and some cobbles; pH 4.8.

C 20 + inches—olive gray (5Y4/2) loam; structureless; firm; mottled with gray streaks and occasional brown patches; very slaty; pH 5.0.

D 22 inches—ledge.

In the very poorly drained positions the surface is mucky to a depth of 8 to 10 inches over a thin, mottled B horizon that grades into the bedrock at 12 to 15 inches.

Utilization—The Middlewood sandy loam is usually not suitable for agricultural purposes. Forestry is the best use for this soil.

B. *Soils Developed from Coarse Textured Parent Materials*

In Queens County, the coarse textured parent materials differ sufficiently in composition, color, and consistency and degree of soil development to permit the separation of four catenas. The Halifax and Danesville soils are largely

of quartzite origin and have a gritty, olive colored parent material. The Farmville soils are developed from a mixture of slate, granite and quartzite material that gives rise to very sandy, loose and open soils. Where granite is the dominant rock source, the Gibraltar, and Aspotogan soils are developed. All of these soils have a fairly thick A_2 horizon under a thin, organic surface mat and dark brown B horizons that may be weakly cemented. Along the coast, the coarse textured materials are strongly leached and develop a characteristic profile that has a thick organic surface mat over a thick A_2 horizon. The B horizon is invariably cemented in the upper part regardless of the origin of the parent material. Such soils were separated as the Port Hebert, Lydgate and Roseway soils.

Good natural drainage

HALIFAX SANDY LOAM (214,317 acres)

Description—The Halifax sandy loam occupies the largest acreage of any soil type in Queens County. The parent material is an olive colored sandy loam till in which quartzite is the dominant rock. Some slate and granite fragments also occur in the till. The parent material is usually thin over bed rock, except where enough material has accumulated to form drumlins as described below. The topography ranges from undulating to knobby and a large proportion of the Halifax soils occurs on well drained knolls separated by imperfectly to poorly drained depressions. Over most of the area the soils are shallow and stony. Cobbles and boulders are found in the parent material and on the surface.

The open, porous nature of the material permits free drainage and the soils are well drained to droughty. Vegetation consists of spruce, pine, red oak, red maple, wire birch and hemlock. The Halifax sandy loam described below is typical of that found in Queens County.

A_0 3 to 0 inches—black, fibrous, felty mor; numerous roots; pH 4.0.

A_2 0 to 3 inches—pinkish gray (7.5YR7/2) sandy loam; structureless; very friable; pH 4.0.

B_2 3 to 5 inches—dark brown (7.5YR3/2) sandy loam; granular structure; moderately firm; angular quartzite stones; pH 4.5.

B_3 5 to 15 inches—yellowish brown (10YR5/8) sandy loam; medium granular structure; friable; quartzite stones and cobbles; pH 5.0.

C 15 + inches—pale olive (5Y6/3) sandy loam; structureless firm; numerous quartzite fragments; pH 5.2.

In a few places the B horizon may be weakly cemented and darker in color. The color of the parent materials varies from a pale olive to dark olive gray.

Utilization—Because of its topography there are no large areas of the Halifax sandy loam that might be suitable for agriculture. Stoniness is the principal factor limiting use and most of this soil type is in forest. Some areas of this soil have been cleared, especially along the coast near Liverpool. The fields are small and rock outcrop frequently occurs, but small acreages of hay and grain have been grown on these areas. The small size of the fields and the frequent outcrops make it difficult to use machinery, and production of crops is not efficient. Lime and fertilizer produce good responses on the Halifax sandy loam and many of these small areas will make good pasture. The rougher areas should be left in forest.

Halifax Sandy Loam—Drumlin Phase (5,414 acres)

Description— There are a few areas scattered throughout the County where the Halifax parent material has been deposited deeply enough to form drumlins. These areas are less stony and usually not so excessively drained as the soil on the more level areas , but there are some drumlins that are exceedingly stony.

The profile is similar to that described above for the Halifax sandy loam except that the B_2 and B_3 horizons are usually thicker and the whole solum is deeper.

Utilization—Hay and grain are the principal crops grown where the drumlins have been cleared. It is important to maintain a good supply of organic matter in these soils to improve the moisture holding capacity and to promote biological activity. The soils are acid and require liming before hay or forage crops are grown. Natural fertility is low and the fertility must be built up with artificial fertilizer applications, particularly when such crops as potatoes are grown. Unless these drumlins are fairly free from stone, the most suitable use is pasture or forest. Good stands of pine and hemlock may be grown on the Halifax sandy loam.

Farmville Sandy Loam (76 acres)

Description—This soil, which occupies a large acreage in Lunenburg County, is not of much importance in Queens County. The parent material is a loose, open, pale yellow sandy loam till that is derived from a mixture of slate, quartzite and granite in roughly equal proportions. In places there are pockets of sand and gravel in the till. The internal drainage is moderately rapid to excessive depending on the coarseness of the material. Most areas are stony and quartzite or granite boulders frequently occur on the surface. Tree cover consists of maple, spruce, pine, poplar, oak and fir. A profile description of the Farmville sandy loam is given below.

A_0 3 to 0 inches—black, fibrous, felty mor; pH 4.0.

A_2 0 to 3 inches—pinkish gray (7.5YR6/2) sandy loam; fine granular structure; very friable; pH 4.2.

B_{21} 3 to 9 inches—strong brown (7.5YR5/8) sandy loam; medium granular structure; friable; subangular stones; pH 4.6.

B_{22} 9 to 24 inches—yellowish brown (10YR5/8) sandy loam; medium granular structure; moderately firm; subangular stones and cobbles; pH 4.7.

C 24 + inches—pale yellow (2.5Y7/4) sandy loam; structureless; firm; may be roughly stratified; subangular gravel and cobbles; pH 5.0.

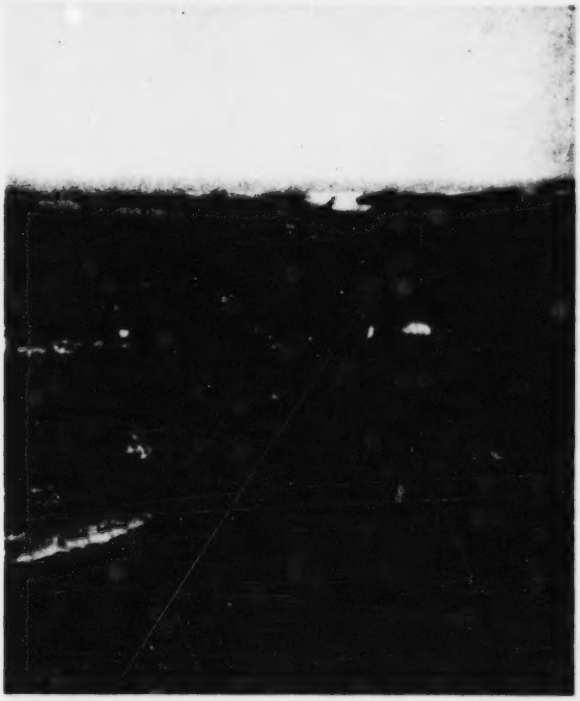
The thick B_{22} horizon is characteristic of this soil and it may range from 15 to 26 inches in thickness.

Utilization—None of the Farmville soil is being used for agriculture in Queens County. The best use of this soil is for forestry.

Gibraltar Sandy Loam (22,182 acres)

Description—The Gibraltar sandy loam occurs principally in the northwestern part of Queens County where the underlying rock is granite. The till is usually very thin and most of the areas are extremely stony. Precipitation enters and moves through the soil very rapidly and the soils tend to be droughty especially when cleared. The topography ranges from undulating to rolling.

Large boulders, often weighing many tons, are scattered over the surface, particularly in the area north of Tobeatic Lake. Many areas have been swept by forest fires and are now covered with a vegetation of blueberry, small pine, wire birch and bracken. The wooded sites are covered with a mixture of maple, birch, fir, spruce, pine and poplar.



Shallow, stony Gibraltar soils occupy the large fire barrens in the northern part of Queens County.

The profile described below is quite typical of the Gibraltar soil found in Queens County.

A_0 4 to 0 inches—black semi- decomposed organic matter; fibrous, felty mor; pH 4.0.

A_2 0 to 4 inches—pinkish gray (7.5YR7/2) sandy loam; structureless; loose and very friable; granite fragments; pH 4.2.

B_{21} 4 to 7 inches—dark reddish brown (5YR3/4) sandy loam; coarse granular structure; firm; weakly iron cemented; pH 4.4.

B_{22} 7 to 18 inches—yellowish brown (10YR5/8) sandy loam; structureless; friable; granite cobbles; pH 4.6.

C 18 + inches—pale yellow (2.5Y7/4) sandy loam; structureless; firm; very stony or bouldery; pH 5.0.

The dark brown B horizon is usually weakly cemented in the Gibraltar soils and is darker than the B horizon in the Halifax soils. The surface organic layer is thicker near the coast where there is more moisture.

Utilization—Most of the Gibraltar sandy loam in Queens County is suitable only for forest. Stoniness is the factor which limits its use. The Gibraltar soils, because of their origin, are somewhat better supplied with bases than some of the other soils of the area. Good tree growth is obtained on these soils and, with proper management, the use of these soils for forestry will yield good returns.

Port Hebert Sandy Loam (9,011 acres)

Description—The Port Hebert soils are confined to the coastal areas where high moisture conditions favor strong leaching of the coarse textured parent materials. The parent materials of the Port Hebert soils are largely derived from slate, quartzite, schist and granite in varying proportions and the profile developed on these materials is dominated by climate. Such soils tend to have thick, organic surface horizons and cemented B horizons, regardless of the type of material from which they originated. The Port Hebert soils occur on undulating relief and usually have sufficient surface stone to make clearing difficult. In general topographic appearance they somewhat resemble the Halifax soils, but differ in their degree of development.

Internal drainage is moderately rapid, although the thick surface may tend to hold the moisture for some time after rain has fallen on it. The vegetation consists chiefly of pine, birch, poplar and spruce, with an undergrowth of blueberry, crowberry and other heath type plants. A profile of the Port Hebert sandy loam is described below.

A_0 8 to 0 inches—black semi-decomposed organic matter; greasy to granular mor; fibrous; pH 3.9.

A_2 0 to 4 inches—gray (10YR5/1) sandy loam; very friable; infiltrated with organic matter; pH 4.2.

B_{21} 4 to 6 inches—very dark brown (7.5YR2/2) sandy loam; firm; iron cemented; organic streaks; pH 4.4.

B_{22} 6 to 20 inches—yellowish brown (10YR5/6) sandy loam; firm; weakly cemented; breaks out in small subangular blocks; stony; pH 4.5.

C 20 + inches—pale yellow (5Y7/4) sandy loam; firm; stony to bouldery; pH 4.5.

Granite and quartzite boulders are present throughout the profile and on the surface. The soils are characterized by a high content of organic matter in the upper B horizon.

Utilization—Practically all of the Port Hebert soils are unsuitable for agriculture. Some small areas have been cleared and used for gardens or small pastures and hay fields. Usually the fields are too stony to permit the use of machinery and hay must be cut by hand. These soils are best suited to forest.

Imperfect natural drainage

Danesville Sandy Loam (109,785 acres)

The soils of the Danesville series occupy about 16 per cent of the surveyed area. They occur on the imperfectly drained sites associated with the Halifax soils and are developed from an olive colored sandy loam parent material. The

Many areas along the coast are extremely stony. Such areas should be forested.

Large areas of the Port Hebert soils have limited use because of stoniness.

topography ranges from undulating to long slopes where surface drainage is adequate, but internal drainage is restricted by the bedrock or the firmness of the parent material. Stoniness and shallowness are common features of the Danesville soils. The profile features are similar to those of the Halifax soils, except that mottling occurs in the lower horizons. Vegetation consists of red maple, spruce, poplar and hemlock. Cleared pastures contain brown top, red top, poverty grass, rushes and sedges. The profile of the Danesville sandy loam is described below.

A_0 3 to 0 inches—black, semi-decomposed organic matter; felty mor; fibrous; pH 3.8.

A_2 0 to 4 inches—light gray (10YR7/2) sandy loam; granular structure; friable; faintly mottled; pH 4.0.

B_{21} 4 to 11 inches—dark brown (7.5YR4/4) sandy loam; medium granular structure; moderately firm; may be weakly iron cemented; yellowish brown, medium, distinct mottles; pieces of slate and quartzite; pH 4.6.

B_{22} 11 to 22 inches—yellowish brown (10YR3/2) sandy loam; coarse granular structure; firm; distinct, coarse brown mottles; pH 5.0.

C 22 + inches—olive (2.5Y4/4) sandy loam; structureless; firm; coarse, distinct rusty brown mottles; considerable quartzite fragments and occasional boulders; pH 5.2.

The amount of mottling in the profile varies with the degree of drainage. Stones and boulders are common throughout the profile.

Utilization—The Danesville soils are generally not suited to agriculture. The largest cleared areas in Queens County occur south of Liverpool and westward along the coast, south of the main highway. Here, the small fields and stone fences are evidence of the labor required to clear the soil. The fields are small and it is unusual to find a field of 5 acres with no large stones or rock outcrop in it. Many of the fields have enough rock outcrop to seriously hinder the use of heavy farm machinery and hand tools are used. Hay and grain are the principal crops, with small areas devoted to local gardens. In some cases, hay must be cut by hand, because of the frequency of rock outcrop. Once cleared, these soils seem to provide excellent pasture that responds well to fertilization. The moist climate of the area favors the growth of grasses and prevents drying out in the summer months. A good proportion of the Danesville soils are cultivated by part-time fishermen and not much care is taken to improve the fertility of the soils.

Most of the Danesville soils are covered with forest and this is their best use.

Lydgate Sandy Loam (2,649 acres)

Description—The soils of the Lydgate series occur in association with the Port Hebert soils where the relief is less favorable for natural drainage. Internal drainage is moderately slow, due to a thick layer of organic matter on the surface and also to a weakly cemented B horizon that restricts the downward movement of water. The Lydgate soils are found on more level or gently undulating topography than the Port Hebert soils and stoniness is a common characteristic. Granite boulders of large size are frequently seen on the surface.

Tree growth consists of red maple, wire birch, spruce and occasional pine with an undergrowth of blueberry, labrador tea, crowberry, spirea and other plants. A description of the Lydgate soil is given below.

A_0 6 to 0 inches—black, greasy mor; fibrous; pH 3.8.

A_2 0 to 6 inches—light brownish gray (10YR6/2) sandy loam; medium granular structure; infiltrated with organic matter; very faintly mottled; pH 4.3.

B_{21} 6 to 9 inches—dark reddish brown (5YR3/2) sandy loam; firm; weakly iron cemented; yellowish brown mottles; pH 4.4.

B_{22} 9 to 26 inches—strong brown (7.5YR5/6) sandy loam; firm; weakly cemented; dark brown, distinct mottles; pH 4.5.

C 26 + inches—light gray (5Y7/2) sandy loam; firm; stony; mottled; pH 4.5.

The mottling varies with the degree of drainage, but it is usually very distinct in the lower horizons and there is a rapid change of drainage conditions over short distances. Burned-over areas have a surface covering of sphagnum moss.

Utilization—Very little use is made of Lydgate soil in Queens County and large areas are broad, heath-covered barrens. A few small cleared areas have been used for pasture. Probably the most profitable use of the Lydgate soils is for forestry and spruce seems to grow very well.

Poor natural drainage

ASPOTOGAN SANDY LOAM (1,997 acres)

Description—Poorly drained areas and depressions that occur in association with the Gibraltar, Farmville, and Halifax soils have been mapped as Aspotogan sandy loam. These soils are found in depressions or on flat hilltops where drainage is restricted and water has difficulty in running off the surface or through the profile. The soils are shallow and stony and covered with a growth of spruce, red maple, tamarack and alders with an undergrowth of sphagnum moss. The profile described below is commonly observed in the Aspotogan soils in Queens County.

A_0 8 to 0 inches—black, semi-decomposed organic matter; often mucky; pH 4.0.

A_{2g} 0 to 7 inches—light gray (10YR7/2) sandy loam; structureless; moderately firm; medium dark grayish brown patches; pH 4.2.

B_g 7 to 14 inches—very dark grayish brown (10YR3/2) sandy loam; granular structure; numerous, distinct, yellowish brown mottles; numerous stones; pH 4.8.

B_{2g} 14 to 24 inches—dark brown (7.5YR3/2) sandy loam; firm; mottled with dark yellowish brown streaks; very stony; pH 5.0.

C 24 + inches—dark yellowish brown to light olive gray (5YR6/2) sandy loam; firm; moist; strongly mottled; stony; pH 5.2.

The depth of the solum is usually not more than 15 to 18 inches. The B horizon is firm, but does not appear to be cemented in the poorly drained soil.

Utilization—The Aspotogan sandy loam is not suitable for agriculture. Most areas are covered with a thick growth of black spruce or tamarack and cleared areas should be allowed to revert to forest. Even when drained, the soils are too stony for profitable crop production.

Roseway Sandy Loam (153 acres)

The Roseway soils cover only a very small area in Queens County. They have been mapped where poor drainage occurs in association with the Port Hebert and Lydgate soils. For the most part, these areas resemble bogs in appearance. Although there is usually not as much surface stone on the Roseway as on the Lydgate soils, there are some very large boulders. Internal drainage is very slow. Vegetation consists of black spruce, tamarack, red maple and alder. A thick layer of sphagnum moss is common on the surface of the soil. The typical Roseway profile is described below.

A_0 8 to 0 inches—black semi-decomposed organic matter; greasy mor; pH 4.0.

A_{2g} 0 to 6 inches—dark gray (10YR4/1) sandy loam; moderately firm; distinct, dark grayish brown patches; organic streaks; pH 4.2.

B_{21g} 6 to 12 inches—very dark grayish brown (10YR3/2) sandy loam; granular structure; distinct, yellowish brown, large mottles; numerous stones; pH 4.8.

B_{22} 12 to 22 inches—grayish brown to light olive (2.5Y5/4) sandy loam; firm; dark yellowish brown streaks; numerous stones; pH 5.0.

C 22 + inches—pale olive (5Y6/3) sandy loam; firm; moist; dark brown mottles; stony; pH 5.2.

There is considerable variation in mottling throughout the profile. Frequently there is no differentiation between the B horizons and the whole profile is strongly gleyed. The Roseway soils resemble the Aspotogan soils, but have a higher organic matter content.

Utilization—The Roseway soils are unsuitable for agricultural purposes at present.

C. *Soils Developed from Gravelly Sandy Loam Stratified Parent Materials*

This group of soils includes two series that are developed from materials deposited by streams flowing from or within the ice sheet. The Lahave soils are developed from parent materials containing a major proportion of slate; the Medway soils are largely quartzitic in origin. Both series are deposited in the form of outwash plains, kames and eskers.

Good natural drainage

Lahave Gravelly Sandy Loam (243 acres)

Description—The Lahave gravelly sandy loam covers only a small area in Queens County. The parent material is a slaty gravel that is roughly stratified. In a few places the slate is cemented together by iron leached from the pyrite in the slate. Topography varies from more or less level plains to hummocky relief. Both surface and internal drainage are rapid and the soil has a low moisture holding capacity. In some places, granite boulders occur on the surface, but generally the Lahave soil is free from surface stone. Where forested, the tree cover consists of pine, wire birch and some poplar. Cleared areas are covered with a mixture of sweet fern, poverty grass, spirea, blueberry and wild strawberry.

70795-0—3

A profile representative of the Lahave soil is described below.

A_0 3 to 0 inches—black, felty, semi-decomposed organic matter; felty mor; very fibrous; pH 4.0.

A_2 0 to 3 inches—white (10YR8/2) sandy loam; structureless; very friable; small slate fragments; pH 4.2.

B_{21} 3 to 10 inches—yellowish brown (10YR5/6) sandy loam; fine granular structure; slightly firm; friable; pH 4.4.

B_{22} 10 to 22 inches—brownish yellow (10YR6/8) gravelly sandy loam; medium granular structure; moderately firm; slaty gravel and granite cobbles; pH 4.5.

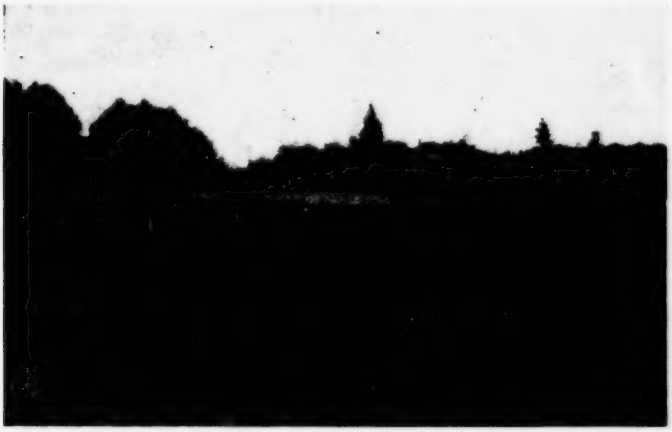
C_1 22 to 30 inches—grayish brown (2.5Y5/2) gravelly sandy loam; very gravelly; firm; pH 4.6.

C_2 below 30 inches—roughly stratified sand and gravel; shows cross bedding, heaving and slumping.

The Lahave gravelly sandy loam.

The amount of gravel in the upper horizons varies considerably but usually the surface layers are fairly sandy, especially on the more level areas.

Utilization—Because of topography, very little of the Lahave gravelly sandy loam is suitable for use in Queens County. Where there are level areas, these are small but are suitable for hoed crops provided that organic matter is maintained and fertilizer is used. Small fruits are well adapted to this type of soil and the rougher areas are suitable for poultry raising. Generally, the more level tracts of this soil in Queens County are too small to make the production of crops profitable. Probably forestry is the best use for this soil.



Medway sandy loam. When Medway and Lahave soils have fairly level topography, they are usually finer in texture and suitable for cultivation.

Medway Sandy Loam (1,030 acres)

Description—The larger areas of the Medway soils occur along the Medway river valley around Mill Village and Charleston and west of Liverpool. The parent material is a grayish brown gravelly sandy loam that has been derived principally from quartzite mixed with a small proportion of granite. The Medway soils occur chiefly on kames and eskers or on small gravelly mounds deposited on rough topography underlain by quartzite or granite. Internal drainage is rapid to excessive and most of the soils have a coarse gravelly texture. Quartzite and granite boulders frequently occur on the surface and in places the Medway soils are very stony. When forested, the vegetation is chiefly birch, pine, spruce, maple and occasional oak. A typical profile of the Medway series is described below.

A_0 4 to 0 inches—black, semi-decomposed organic matter; loose, matted mor; pH 4.0.

A_2 0 to 2 inches—gray (10YR6/1) sandy loam; structureless; very friable; quartzite fragments; pH 4.2.

B_{21} 2 to 6 inches—dark yellowish brown (10YR4/4) sandy loam; medium granular structure; friable; quartzite cobbles; pH 4.5.

B_{22} 6 to 20 inches—yellowish brown (10YR5/6) coarse sandy loam; medium granular structure; large amount of cobbly gravel; firm; pH 4.5.

C 20 + inches—gray (5Y6/1) gravelly sandy loam; firm; structureless; quartzite cobbles and pebbles; pH 4.8.

70795-0—3½

There is a variation in the amount of gravel and stone in the various horizons and in the texture of the sand, which may range from fine to coarse. In a few places the B horizon is weakly cemented in the upper part and darker in color. Around Charleston the soils are shallow over bedrock, but this does not affect the drainage. In general, the Medway soils are more gravelly in the surface than the Lahave soils. Around Hunts Point the surface is mostly fine sand to a depth of about 14 inches. West of Liverpool the Medway soils occur as pitted outwash and the gravel is cobbly.

Utilization—The principal area of the Medway soil under cultivation is found around Mill Village. Here the topography is gently undulating and although the soils vary in depth to bedrock, there is not much surface stone and the surface soil is a sandy loam. Potatoes, cabbage and strawberries are the principal crops. It is necessary to maintain organic matter in these soils and to fertilize quite heavily for continued profitable crop production. In general the Medway soils are not suitable for hay and grain crops.

The chief use of the Medway soils has been as a source of road material and the individual soil areas are so scattered that this will probably continue to be the chief use. The soils support a good growth of pine and the rougher areas should remain in forest.

D. *Soils Developed from Recently Deposited Medium Textured Parent Materials*

Imperfect natural drainage

Cherryfield Fine Sandy Loam (45 acres)

Description—The Cherryfield soils occur along the upper course of the Medway river. The parent materials consist of sediments washed from the surrounding hills and deposited as a flood plain along the river course. The soils are immature and have not been in place long enough to develop profile characteristics. The topography ranges from level to depressional and the soils are free from stone. When forested, the Cherryfield soils support a growth of spruce, red maple, tamarack and poplar. The description given below is quite typical of the Cherryfield fine sandy loam.

1. 0 to 10 inches—dark brown (10YR4/3) fine sandy loam; fine granular structure; friable; pH 4.0.
2. 10 to 22 inches—brown (10YR5/3) sandy loam; fine granular structure; slightly firm; mottled with numerous, gray, distinct mottles; pH 4.5.
3. 22 to 28 inches—dark gray (10YR5/1) fine sandy loam; finely laminated; slightly plastic; moderately firm; gray and dark brown, coarse mottles; pH 4.8.
4. 28 to 36 inches—yellowish brown (10YR5/4) fine sandy loam; firm; mottled with dark brown patches; pH 4.9.
5. 36 + inches—gray gravel and coarse sand; weakly stratified.

The texture of these soils from 10 to 30 inches deep may range from a sandy loam to a silt loam. In the poorer drained positions, the lower layers have an olive cast and dark mottling.

Utilization—Practically none of the Cherryfield soils is utilized in Queens County. Where the areas are of sufficient size, they are suitable for hay and grain crops or for pasture, but such areas are often subject to flooding. There are a few places where this soil could be used as supplementary pasture in conjunction with the upland soils.

E. *Organic Soils*

Two types of organic soils have been mapped in Queens County, one a sedge peat and the other a raw sphagnum peat. Both of these soils occupy depressional areas in the topography or level tracts along streams or lakes where sedimentation is taking place.

Poor natural drainage

Rossignol Sedge Peat (4,128 acres)

Description—These soils are found around the borders of shallow lakes or along slowly moving streams, where they form a wet type of meadow. They are poorly drained, free from stone and consist largely of decomposed sedge species mixed with fine mud that has been washed or settled into the decomposed material. Areas that are now some distance from open water have a covering of sedges and some sphagnum moss.

A description of the Rossignol soil is given below.

1. black, semi-decomposed organic material, sedge and sphagnum moss; 8 to 10 inches thick.
2. black or grayish black fine sandy loam to silt loam mixed with semi-decomposed sedge; 2 to 5 feet thick.
3. slaty gravel and bedrock.

The depth of material ranges from 20 inches to 6 feet. In a few areas, organic matter in the solum is well decomposed resulting in black, silty loam.

Utilization—There are some areas along the stream courses that become firm and dry enough in the summer months to permit vehicles to move over them and these areas are sometimes cut for hay. On the best drained areas, timothy will grow, but Carex species form the dominant vegetation. The greater part of the Rossignol soil is too wet for use. Where the deposits are far removed from open water, it is sometimes possible, through drainage and dyking, to reclaim some fertile land.

Peat (30,956 acres)

Queens County contains large areas of peat, particularly in the western part. These areas are the sites of former lakes that have filled in with decaying vegetation. Many of the areas have a cover of stunted black spruce and tamarack; others are free of trees.

In practically all of the areas the surface consists of a thick layer of sphagnum moss 10 to 15 inches thick. This is underlain by a semi-decomposed mass of the same material. Decomposition increases with depth and some deposits may extend to a depth of 10 feet. Usually the bogs are quite shallow and average about 5 feet in depth.

The peat is of no use at present and is generally not humified enough to make peat fuel.

F. *Miscellaneous Soils*

This group includes swamp, salt marsh, coastal beach and rock land areas not suitable for agriculture. In Queens County such areas, together with the area covered with lakes, make up about 18 per cent of the county area.

Swamp (11,942 acres)

Areas mapped as swamp occur in very poorly drained depressions associated with most of the mineral soils. Water stands on the surface for a good part of the year. Most of these areas are very stony and unsuitable for agriculture.

The vegetation common on most swamps consists of black spruce, tamarack, poplar and fir; others are covered with a mixture of sedges, reeds and cat-tails.

The surface soil is a mucky, organic layer, usually 8 to 10 inches thick overlying a grayish brown, strongly mottled, mineral soil horizon. The B horizon is dark in color and mottled with coarse, distinct mottling and the underlying parent material is also strongly mottled and firm to compact.

These soils are not suitable for agriculture. They are stony and difficult to drain and should remain in forest.

Salt Marsh (70 acres)

There are a few small areas of salt marsh along the coast. These areas are flooded by recurring tides and are composed of sediments deposited by the tidal waters or by former streams whose banks were formerly above tide level. The deposits consist of a grayish silt or silt loam mixed with reeds and sedges in various states of decomposition. The surface of the deposits is covered with a growth of salt tolerant grasses and reeds.

At present, the salt marsh are of little value for agriculture.

Coastal Beach (787 acres)

Several large areas of coastal beach occur in Queens County. These are deposits of gray quartzite or granite sand along the coast laid down by wave action. At the inner edge of these beaches, there are often ridges of cobblestone piled up by storm waves or there may be small sand dunes stabilized by the growth of grasses.

Many fine beaches are to be found in the County and these are a source of recreation and attract a large number of summer visitors. The beaches are not suitable for agriculture.

Rock Land (16,256 acres)

Rock land includes areas mapped throughout the County where the bedrock is exposed on the surface, making up 60 to 90 per cent of the surface area. Some very shallow soils are developed on these areas, but they have no agricultural value.

In many cases it might be possible to reforest these areas by starting trees in places where the soil will support tree growth and building up the surface layer over the rock. At present such areas have no value.

AGRICULTURAL LAND USE

Historical

Little is recorded about the early agriculture of Queens County. The first settlements were along the coast where there is very little agricultural land. Liverpool was founded in 1759 by seven families who brought livestock with them. Port Mouton was settled in 1784 and some 300 houses were built, but the village was destroyed by fire in the following year and the inhabitants moved to Guysborough County. The better agricultural areas, in the northern part of the County, were settled later. South Brookfield was the first settlement in the northern district and Caledonia was settled in 1820 by Scottish families. Early crops seem to have consisted of hay, wheat, corn and some oats. Flour was ground in local mills and used at home. Vegetable growing was an important industry, since the fishing fleets and other vessels created a demand for these products.

It was soon found that the better farming areas were located in the northern part of the County where the soils were deep and less stony; this area has become the important agricultural area.

Present Land Use

The 1951 census of Queens County shows that approximately 7 per cent of the area is occupied by farms; the remainder is chiefly in forest or rough land. Only 10.5 per cent of the occupied land is improved, the remainder consisting of 89 per cent woodlots and 11 per cent rough pasture, swamp or wasteland. The farms average about 180 acres, but 42 per cent of the farms range from 10 to 130 acres in size. The average improved area per farm is 18.7 acres. The farm size and the improved area per farm vary widely throughout the County. There are several farms of over 400 acres. The area and condition of occupied land in Queens County are given in Table V.

TABLE V. AREA AND CONDITION OF OCCUPIED LAND IN QUEENS COUNTY—1951

Total land area	682,630 acres
Area in farms	48,984 acres
Improved	5,123 acres
Field crops	3,160 acres
Pasture	1,652 acres
Orchard	26 acres
Other	285 acres
Unimproved	43,861 acres
Woodland	39,219 acres
Other	4,642 acres
No. of farms	273
Average area per farm	180 acres
Average improved area per farm	18.7 acres

Hay, oats, potatoes and roots make up about 96 per cent of the field crops grown in the County. Hay occupies by far the largest acreage and usually consists of clover and timothy. Small acreages of alfalfa are also grown.

About 54 per cent of the improved land is occupied by hay, 3 per cent by oats and mixed grain and 2.5 per cent by potatoes and roots. Pasture covers about 32 per cent of the improved area and the remainder is in vegetable crops and orchard. The acreage of field crops in 1941 is compared with that in 1951 in Table VI.

TABLE VI.

ACREAGE OF FIELD CROPS IN QUEENS COUNTY—1941 AND 1951

	1941	*1951*
Hay	3,591	2,770
Oats	209	149
Potatoes	216	86
Roots	105	33
Barley	47	9
Mixed grain	19	—
Wheat	—	2

There has been a considerable drop in the crop acreage of all crops reported in the ten-year period. The number of abandoned farms in the area may account for this. Livestock are kept on practically all the farms in the County and there are several good herds of dairy cattle. Some hogs are kept in conjunction with dairy farming. The production of milk in 1951 reached about 3 million pounds of which roughly 16 per cent was consumed on the farm. Table VII gives the numbers of livestock in the County for 1941 and 1951.

TABLE VII.

LIVESTOCK ON FARMS IN QUEENS COUNTY—1941 AND 1951

	1941	*1951*
Horses	173	214
Cattle	2,663	1,515
Sheep	551	413
Swine	551	313
Poultry	13,568	14,766

There has been a small increase in the number of horses kept. Many of these animals are used in lumbering and there is always a fair demand for good horses, especially when an increase in lumbering takes place. Poultry raising has increased in the ten year period largely due to increase in the size of the farm flock and to additional commercial farms. Poultry raisers are able to use land not generally suitable for crops and there is room for more of this type of farming.

A considerable proportion of the income in Queens County comes from lumbering. In 1951, the value of forest products cut was $112,451. About 34 per cent of this came from pulpwood and 34 per cent from sawn lumber. The remainder was derived chiefly from fuel wood, fence posts, telegraph poles and pit props.

In Queens County 97 per cent of the farms are owner operated and most of the farms have electricity.

Use and Management of Queens County Soils

Use of the soil for farming will depend on a number of factors such as topography, stoniness, drainage, depth and natural fertility. Economic factors such as distance from market and the type of crop to be grown may also affect land use.

Soil management involves applying to the soil cultural and fertilizer practices that make best use of its natural characteristics and will obtain optimum and economical production over a long period of time.

More than 23 per cent of Queens County is occupied with lakes, swamps, rock land or peat bogs and will never be suitable for agriculture. Of the remaining land, there are large areas that are not suitable for crop land because

of stoniness, shallowness, or poor drainage. The most suitable areas for crop production are confined principally to the drumlins in the northern part of the County. Here the soils are deeper and comparatively free from stone. These soils make up about 4 per cent of the area.

In the discussion of soil management that follows, the soils have been grouped according to texture, since the texture of the soil is related to a number of other properties that determine its use and management. The discussion is necessarily general, because agricultural practices are much the same throughout the County. Not enough is known at present as to how the soils would react under different systems of management and cultural practices.

GROUP I. MEDIUM TEXTURED SOILS

Soil Type	*Acreage*	*Total*
(a) well drained		
Mersey loam	9,401	
Bridgewater loam—drumlin phase	25,888	
Bridgewater sandy loam	114,444	149,733
(b) imperfectly drained		
Livepool sandy loam	1,286	
Riverport sandy loam	5,331	
Cherryfield fine sandy loam	45	6,662
(c) poorly drained		
Middlewood sandy loam	307	307

The Bridgewater loam—drumlin phase—is the most suitable and most cultivated soil in this group. The drumlins are composed of deep deposits of slaty material and are relatively free from stone. Some areas of the Bridgewater sandy loam are also suitable for cultivation, as are also small acreages of the Mersey loam, where these soils have fairly deep parent material and the stone can be easily removed.

The imperfectly drained Liverpool and Riverport soils usually require some form of drainage for crop production, but there are a few areas that are suitable for pasture or hay crops without artificial drainage being necessary. The poorly drained Middlewood soil is unsuitable for cultivated crops, and should remain in forest.

The management practices discussed below apply to the well drained soils of the group or to the other soils when their drainage has been improved. Most farmers practice some form of a rotation in which hay land is turned over to roots or grain. On the drumlin areas, it is a usual practice to leave the land in hay for a period of two to five years and to follow this with roots or potatoes and then grain. On the more steeply sloping drumlins, the land on the top of the drumlins is rotated more often than that on the sides. Keeping the sides of these drumlins in hay helps to prevent erosion, but often the fields are left so long that they run out and erosion begins. The steeper slopes should be allowed to return to forest; some type of contour farming would likely be beneficial on more gentle slopes.

The most common hoed crop grown is potatoes, followed by roots. In the earlier days, large acreages of hay were grown to feed the horses in the lumber camps. Today a considerable quantity of vegetables is being imported into the area, but much of this could be grown locally with some slight alterations in management practices. The soils are quite acid and lime is needed, particularly for hay crops and to get a catch of clover. The organic matter content of the soils on the drumlins is fairly well depleted and generally needs building up, although a few farmers have been able to maintain a fairly good supply in the soil. Commercial fertilizers are applied to grain and vegetable crops. The principal varieties used are 5-10-10, 5-10-13, 6-12-12

and 3-15-6. Various rates are used on different crops, but it is usual to apply 500 to 800 pounds per acre on grain and up to 2,000 pounds per acre on potatoes or roots. Many farmers have found that the addition of borax is necessary to prevent brownheart when growing turnips. Where dairy farming is carried on, there is a good supply of manure to apply to the hayfields and this maintains organic matter and builds up soil fertility. A few good orchards are found on the Bridgewater soils which seem to be suited to this type of culture. There is a possibility that trees may suffer from magnesium deficiency on the soils since available magnesium supply is low. This could be corrected by fertilization.

The Cherryfield soils that lie along the river courses are among the most fertile soils in the County, but their susceptibility to flooding often makes them unsuitable for use. There are a few areas of these soils that could be used for hay or pasture. The remainder of the soils in this group are not used to any extent for crop production. Some areas used for pasture could be improved by fertilization, but the rougher areas should be left in forest.

GROUP II. COARSE TEXTURED SOILS

Soil Type	*Acreage*	*Total*
(a) well drained.		
Halifax sandy loam	214,316	
Halifax sandy loam—drumlin phase	5,414	
Farmville sandy loam	77	
Gibraltar sandy loam	22,182	
Port Hebert sandy loam	9,011	
Lahave gravelly sandy loam	243	
Medway sandy loam	1,030	252,273
(b) imperfectly drained.		
Danesville sandy loam	109,785	
Lydgate sandy loam	2,649	112,434
(c) poorly drained.		
Aspotogan sandy loam	1,996	
Roseway sandy loam	154	2,150

The soils in this group are not generally suitable for agriculture because of drainage or stoniness. The drumlin phase of the Halifax soil is suitable for cultivation, if not too stony. Considerable areas of the imperfectly drained Danesville soils have been cleared in the County, particularly along the coast. These areas seem to produce fair hay crops and make excellent pasture, but the shallowness of the soil and the occurrence of rock outcrops in the fields make them less suitable for production of hoed crops.

A few areas of the Medway soils have been cultivated and are used chiefly for vegetable production, but they are not suitable for hay or pasture.

Where any of the soils of this group can be cultivated, there is need for lime to reduce the acidity of the soil. Most of the soils require a good supply of organic matter and their natural fertility is low, so that fertilization is necessary to obtain good yields. All other areas of soils in this group are best suited to forest.

In general, the Bridgewater soils on the drumlins form the principal agricultural soils of the County. All of the soils require liming and fertilization for crop production and the maintenance of organic matter is important, particularly in the coarser textured soils. The Bridgewater soils show a deficiency of available magnesium and this should be taken into account when planning crop rotations. More attention could be paid to pastures in the area. These respond well to phosphate fertilization and in most cases, their carrying capacity could be doubled.

The stonier areas should remain in forest and there are large areas of barren lands in the County that could be reforested to advantage.

The Suitability of Soils for Crops—Soil Rating

The ability of a soil to produce a crop is governed by a number of factors inherent in the soil and the climate under which it exists. The best measure of this ability is probably the crop yield, since this is the ultimate result of the interaction of all factors concerned.

At present, it is difficult to obtain accurate figures for crop yields on any particular soil for a given type of management. Therefore, the suitability of a soil for use must be judged from its natural characteristics, from information obtained from those using the land and from observations made during the course of the survey. This information has been used to prepare a rating of the soils of Queens County and the results are presented in Table VIII.

TABLE VIII

SUITABILITY OF SOILS FOR PRINCIPAL CROPS GROWN IN THE AREA

	Hay	Grain	Potatoes	Market Garden Crops	Orchard	Pasture
CLASS I						
Good Crop Land						
Bridgewater loam—drumlin phase	G	G	G	G	G	FG
CLASS II						
Good to Fair Crop Land						
Cherryfield fine sandy loam	FG	FG	FP	FG	P	F
CLASS III						
Fair Crop Land						
Halifax sandy loam—drumlin phase	F	F	FG	FG	F	F
Mersey loam	F	F	F	FP	FP	G
CLASS IV						
Fair to Poor Crop Land						
Daneaville sandy loam	F	FP	P	FP	P	FG
Bridgewater sandy loam	F	F	FP	FP	F	FP
Riverport sandy loam	FP	FP	FP	FP	P	FP
Liverpool sandy loam	FP	FP	FP	FP	P	FG
Lydgate sandy loam	FP	P	P	P	P	FG
Lahave gravelly sandy loam	P	P	FG	FG	P	P
Medway sandy loam	FP	FP	FG	FG	FP	P
CLASS V						
Poor Crop Land						
Halifax sandy loam	FP	FP	FP	P	P	P
Farmville sandy loam	FP	FP	FP	P	P	P
Gibraltar sandy loam	P	P	P	P	P	P
Port Hebert sandy loam	P	P	P	P	P	P
Aspotogan sandy loam	P	P	P	P	P	P
Roseway sandy loam	P	P	P	P	P	P
Middlewood sandy loam	P	P	P	P	P	P

G–good; F–fair; P–poor; FP–fair to poor; FG–fair to good.

The soils have been grouped into five classes according to their suitability for cropping to selected crops. Such a classification is general and is based on observation of crops grown under prevailing systems of management. Future improvements in crop varieties, new techniques and systems of management may alter some of the ratings. Certain soils are better fitted for a particular crop than others and differences in management may produce better yields on the same soil type. Soils which may be generally classed as poor crop land may be suitable for a special crop, but economic conditions may not permit its production. A change in conditions would favorably raise the rating of such a soil.

The various properties of the soils have been discussed above. In Table IX below, the factors that limit the use of each soil type are noted. The correction of some of these factors will usually make the soil suitable for use, but this is often not economically feasible.

TABLE IX

ACREAGE AND USE LIMITATIONS OF THE VARIOUS SOIL TYPES

Class I	*Acreage*	*Limitations*
Good Crop Land		
Bridgewater loam—drumlin phase	25,888	slope, erosion.
Class II		
Good to Fair Crop Land		
Cherryfield fine sandy loam	45	flooding; drainage.
Class III		
Fair Crop Land		
Halifax sandy loam—drumlin phase	5,414	low fertility; stoniness, droughtiness.
Mersey loam	9,401	stoniness; shallowness.
	14,815	
Class IV		
Fair to Poor Crop Land		
Danesville sandy loam	109,785	stoniness; drainage; shallowness
Riverport sandy loam	5,337	shallowness; drainage
Liverpool sandy loam	1,286	stoniness; drainage; topography
Lydgate sandy loam	2,649	stoniness; drainage; shallowness
Lahave grav. sandy loam	243	droughtiness; topography
Medway sandy loam	1,030	droughtiness; topography; stone
	120,330	
Class V		
Poor Crop Land		
Halifax sandy loam	214,316	stoniness; low fertility; relief
Farmville sandy loam	77	stoniness; low fertility; droughtiness
Gibraltar sandy loam	22,182	stoniness; low fertility; droughtiness
Port Hebert sandy loam	9,011	stoniness; low fertility; relief
Aspotogan sandy loam	1,996	stoniness; drainage
Roseway sandy loam	154	stoniness; drainage
	247,736	

DISCUSSION OF THE CHEMICAL ANALYSIS OF THE SOILS

The chemical and physical analyses of some of the major soil types found in Queens County are given in Table X. The composition of the soil parent material and the action of the soil forming factors on this material are reflected in the composition of the soils themselves.

Loss on Ignition—The loss on ignition represents the loss of volatile material on heating. This gives some indication of the amount of organic matter and nitrogen in the soil. There is a considerable difference between the amount of organic matter in the virgin sample and the cultivated soil. When the forest cover is removed, there is a rapid depletion of organic matter. The average loss on ignition of the surface layer of forest soils ranges from 70 to 90 per cent, but in cultivated areas the surface horizon may contain only 6 to 10 per cent of volatile material.

In forested soils, the B_2 horizon shows a higher loss on ignition than the other horizons in the profile, except the surface, due to the washing down of organic matter from the surface during soil development. In the coarser textured soils this organic matter is concentrated in a thin layer in the profile; in some soils it is better distributed throughout the profile. In general, the Bridgewater soils are better supplied with organic matter than the other soils of the area.

Nitrogen—The nitrogen content of the soils approximately parallels the loss on ignition and the Bridgewater soils have the higher content of this element. The nitrogen content of all the subsoils sampled is low.

pH and Lime Requirement—All of the soils are acid and require liming for successful crop production. Surface acidity ranges from pH 3.2 to 4.1 and that of the subsoil from pH 4.6 to 5.5. This acidity can be reduced by liming and it is preferable to use dolomitic limestone, since most of the soils are low or deficient in available magnesium.

Silica and Sesquioxides—All of the soils analyzed show the effects of podzolization; iron and aluminium compounds have been leached from the upper horizons and deposited in the lower part of the profile. The coarse textured soils, being developed from siliceous parent materials have a high ratio of silica to sesquioxides. On the other hand, the medium textured soils are developed from materials that have a somewhat higher content of bases and ferromagnesian minerals and consequently have a lower silica—sesquioxide ratio than the coarse textured soils.

Calcium and Magnesium—None of the soils of the County have a high calcium or magnesium content. In general, the Halifax, Farmville and Bridgewater soils are better supplied with calcium; the Bridgewater soils have a higher magnesium content than the other soils. The availability of these elements, however, is quite the reverse. The amount of readily available magnesium is low in all soils and symptoms of magnesium deficiency may occur in the area. This can be remedied by applying dolomitic limestone.

Potassium—The available potash is low in all of the soils analyzed.

Cobalt—Recent research indicates that soils in the County are quite low in cobalt. The effect of this deficiency has shown up in cattle where it appears as "wasting disease". The present remedy for this deficiency is to apply cobalt salts to the soil at the rate of 2 to 4 ounces per acre annually where symptoms of the deficiency appear, or to feed cobalt chloride in mineral mixtures.

TABLE X. CHEMICAL AND PHYSICAL ANALYSIS OF REPRESENTATIVE SOIL PROFILES

Horizon	Depth in Inches	Loss on Ignition %	pH	Lime Req. Tons/ Acre	Total N %	Total SiO_2 %	Total R_2O_3 %	Total CaO %	Total MgO %	Exchangeable Bases me/100 gms. of soil H	Ca	Mg	K	Gravel %	Sand 2—.05 mm %	Silt .05—.002 mm %	Clay Below .002 mm %
Farmville Sandy Loam																	
A_0	0–8	10.32	5.05	4.2	0.22	69.67	16.61	0.45	0.68	8.23	0.92	0.18	0.13	17.3	58.9	32.3	8.8
B_1	8–15	5.55	5.32	3.5	0.10	72.25	18.40	0.49	0.83	4.50	0.03	0.20	0.03	23.9	57.3	33.6	9.1
B_2	15–22	3.28	5.32	2.8	0.05	82.02	16.11	0.56	0.58	2.03	0.16	0.14	0.01	23.6	57.1	36.3	6.6
C	22 +	2.17	5.30	1.4	0.09	78.06	17.91	0.53	0.89	2.30	0.44	0.20	0.09	29.1	56.4	41.0	2.6
Bridgewater Loam																	
Cult.																	
Surface	0–6	9.83	5.18	6.3	0.29	62.30	24.67	0.29	0.55	8.80	1.91	0.33	0.10	29.3	47.8	40.4	11.8
A_0	0–1	83.73	3.90	.....	1.54	10.66	3.01	0.32	0.13	82.70	7.09	3.70	1.51	.....	.....	.....	.....
A_2	1–2	17.33	4.52	11.3	0.37	59.32	17.65	0.24	0.46	18.96	1.11	0.11	0.41	19.1	48.8	37.6	13.6
B_1	2–11	8.07	5.00	4.2	0.19	64.61	21.70	0.18	0.27	9.16	0.08	0.00	0.07	18.2	49.8	36.6	13.6
B_2	11–26	5.99	5.00	3.9	0.12	67.41	20.86	0.31	0.63	6.50	0.14	0.00	0.05	13.0	52.2	33.0	14.8
C	26 +	2.34	5.10	2.1	0.03	68.54	21.80	0.29	0.72	3.63	0.17	0.10	0.04	14.0	47.2	23.0	29.8
Bridgewater Sandy Loam																	
A_0	½–6	16.01	4.80	9.2	0.15	60.91	21.46	0.53	0.86	11.97	1.39	0.18	0.90	6.6	50.0	35.8	5.2
B_1	6–16	6.21	5.00	3.5	0.14	62.66	22.46	0.83	1.25	5.50	0.00	0.16	0.07	30.8	61.2	34.2	4.6
B_2	16–30	3.56	5.30	2.1	0.07	70.51	20.77	0.58	0.93	2.97	0.00	0.10	0.05	35.8	56.4	39.8	3.8
C	30 +	2.51	5.50	1.0	0.03	72.99	21.37	0.62	1.05	0.70	0.04	0.40	0.03	29.2	50.6	42.8	6.6

Halifax Sandy Loam

A_0	0–2	74–47	3.45	.....	1.41	17.47	4.11	0.29	0.24	87.00	3.54	2.30	0.97	.....	.....	.....	.....
A_2	2–3	6.24	3.52	4.9	0.10	77.07	11.94	0.24	0.11	3.77	0.22	0.00	0.08	15.8	52.8	39.4	7.8
B_1	3–12	4.74	5.00	2.4	0.09	69.52	18.78	0.31	0.31	6.43	0.08	0.03	0.04	26.0	58.4	35.8	5.8
B_2	12–24	4.74	5.12	2.4	0.08	66.14	21.65	0.31	0.29	5.63	0.05	0.06	0.05	28.3	57.4	37.8	4.8
C	24 +	2.99	5.15	1.7	0.05	70.54	19.09	0.39	0.77	3.63	0.11	0.03	0.06	29.3	55.4	36.8	7.8

Gibraltar Sandy Loam

A_0	0–10	95.55	3.2	63.0	1.14	3.25	0.19	0.16	0.42	119.4	2.21	6.52	1.17	.....	.....	.....	.....
A_2	10–14	3.38	3.9	3.5	0.05	86.15	7.62	0.57	0.19	5.33	0.08	0.08	0.01	3.8	59.8	37.4	2.8
B_1	14–16	8.51	4.7	7.4	0.11	76.40	11.67	0.61	0.25	10.59	0.03	0.18	0.00	24.7	62.6	35.0	2.4
B_2	16–30	3.55	5.0	2.4	0.04	81.28	11.46	0.74	0.27	3.37	0.03	0.06	0.00	15.9	60.6	37.0	2.4
C	30 +	0.77	5.0	0.7	0.01	85.18	9.35	0.77	0.29	1.23	0.00	0.00	0.00	1.6	55.2	42.4	2.4

Mersey Silt Loam

A_0	0–4	86.52	3.6	53.0	1.02	9.90	2.62	0.49	0.52	75.8	8.92	3.07	2.00	.....	.....	.....	.....
A_2	4–5	5.05	3.5	8.4	0.09	77.69	15.33	0.44	0.39	11.37	0.25	0.22	0.15	1.7	37.1	57.7	5.2
B_1	5–12	10.17	4.5	7.4	0.13	66.10	24.27	0.36	0.61	13.33	0.11	0.12	0.14	28.7	45.7	49.6	4.7
B_2	12–26	4.68	5.0	2.4	0.05	66.30	27.31	0.69	0.26	3.83	0.03	0.02	0.04	32.8	38.7	59.5	1.8
C	26 +	1.93	5.1	1.0	0.02	69.63	25.01	0.82	1.65	1.93	0.03	0.04	0.00	29.2	26.6	70.4	3.0

Mersey Silt Loam

A_1	0–3	74.35	3.6	52.6	1.31	18.96	4.91	0.57	0.49	75.4	9.33	3.38	2.49	.....	.....	.....	.....
A_2	3–4	4.90	3.7	10.6	0.11	77.98	15.15	0.18	0.43	14.20	0.78	0.41	0.168	5.8	32.0	60.6	7.4
B_1	4–10	7.71	4.4	11.3	0.14	67.55	27.64	0.23	0.48	16.53	2.04	0.16	0.141	21.6	32.2	60.3	5.0
B_2	10–22	5.94	5.1	2.4	0.08	62.07	28.46	0.23	1.09	4.87	0.02	0.02	0.027	48.5	35.8	59.8	4.4
C	22 +	2.71	5.1	0.7	0.03	66.57	25.78	0.39	1.35	1.60	0.11	0.02	0.00	30.6	36.4	59.6	4.0

SUMMARY

Queens County has a land area of approximately 1,066 square miles. About 23 per cent of this area is occupied by lakes, peat bogs, swamp, salt marsh, and rock land and never will be suitable for agriculture. The County is a broad, undulating plain rising slowly from the seacoast northward to an elevation of about 500 feet above sea level at its northern boundary. In the northeastern part of the County, drumlins rise above the general level and give a hilly appearance to the topography. The County is drained chiefly by the Medway, Mersey, and Broad rivers which flow into the Atlantic Ocean.

Settlement along the coast began about 1759 when Liverpool was founded. Inland villages were established about 1820, when Caledonia was settled and it is here that most of the agriculture of the County is carried on.

The climate of the County is humid temperate with an annual precipitation of about 50 inches. There is considerable difference between the climate on the coast and inland, chiefly in moisture conditions.

The soils are developed from materials deposited as glacial drift and range in texture from silt loam to coarse sandy loam. The maturely developed soils are Podzols. Under forest cover these soils have a fairly thick, gray, leached layer under the organic surface mat. This is underlain by a dark brown horizon, several inches thick, which grades into a yellowish brown horizon that is usually 10 to 15 inches thick. This rests on the parent material at a depth ranging from 15 to 26 inches on the average. Leaching is more intense near the coast and here also the organic surface layer is thicker and the horizon differentiation more pronounced.

The principal vegetation in the County consists of red spruce and balsam fir along the coast with maple, beech, birch, spruce, and hemlock occupying the higher ridges inland. On poorly drained areas black spruce, tamarack, red maple, poplar, and alder are found.

The soils most used for agriculture are the Bridgewater series, chiefly the drumlin phase. These soils occupy about 4 per cent of the County. The remainder of the soils have characteristics of stoniness, drainage, or topography that make them unsuitable for cultivation. Only about 7 per cent of the County's area is in farms.

The principal crops grown are hay, grain, and potatoes. About 54 per cent of the improved land is in hay and 32 per cent in pasture, the remainder being in potatoes, roots, vegetables, and orchard.

All the soils of the area are acid and require liming. The fact that many of the soils show a deficiency of available magnesium points to the benefit to be derived from using dolomitic limestone. Most of the soils have a low natural fertility and fertilization is necessary to produce profitable crops. Many pastures throughout the area could be improved with fertilization. Since most of the County is forested, there is not a serious erosion problem, but the steep slopes of the cleared drumlins require care in handling if used for hoed crops. It would appear that some form of strip cropping might be useful in such cases.

MAPS
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